

## **SITE HEALTH AND SAFETY PLAN (HASP)**

Office: Weston Solutions, Inc. CHI  
Site Name: ESI Environmental, Inc  
Client: US EPA  
Work Location: 4910 West 86<sup>th</sup> Street in Indianapolis, Marion County, Indiana  
WO#: 20405.012.001.1184.00

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SITE HEALTH AND SAFETY PLAN (HASP)				
<b>Review and Approval Documentation:</b>				
Reviewed by: SO/DSM/CHS	Tonya Balla _____ Name (Print)	<i>Tonya Balla</i> _____ Signature	Date: 10/8/10	
Other	_____ Name (Print)	_____ Signature	Date: _____	
Approved by: Project Manager	Rick Mehl _____ Name (Print)	_____ Signature	Date: _____	
<b>Hazard Assessment and Equipment Selection:</b>				
In accordance with WESTON's Personal Protective Equipment Program and 29 CFR 1910.132, at the site prior to personnel beginning work, the SHSC and/or the Site Manager have evaluated conditions and verified that the personal protective equipment selection outlined within this HASP is appropriate for the hazards known or expected to exist. (Refer to Safety Officer Manual Section 2, Personal Protection Program, for guidance.)				
<input type="checkbox"/> <b>FSO</b>	Trenna Seilheimer _____ Name	_____ Signature	Date: _____	
<input type="checkbox"/> <b>Site Manager</b>	_____ Name	_____ Signature	Date: _____	
<input type="checkbox"/> <b>Environmental Compliance Officer</b>	_____ Name	_____ Signature	Date: _____	
<input type="checkbox"/> <b>Dangerous Goods Shipping Coordinator</b>	_____ Name	_____ Signature	Date: _____	
Project start date: 10-8-10	This site HASP <b>must</b> be <b>reissued/reapproved</b> for any activities conducted after:		Amendment date(s)	By:
End date: 12-31-10	Date: 12-31-10		1.	
			2.	
			3.	
			4.	
			5.	

SITE HEALTH AND SAFETY PLAN (HASP)			
<b>Prepared by:</b> Trenna Seilheimer		<b>W.O. Number:</b> 20405.012.001.1184.00	<b>Date:</b> 10-6-10
<b>Project Identification</b> Office: CHI Site Name: ESI Environmental, Inc Client: US EPA Work Location Address: 4910 West 86 <sup>th</sup> Street Indianapolis, Marion County, Indiana		<b>Site History:</b> See below	
<b>Scope of Work:</b> Collect samples from the over 40 existing storage tanks located onsite.			
<input type="checkbox"/> Site visit only; site HASP not necessary. List personnel here and sign off below:			
Regulatory Status:			
Site regulatory status: <b>CERCLA/SARA</b> <b>RCRA</b> <b>Other Federal Agency</b> <input checked="" type="checkbox"/> U.S. EPA <input type="checkbox"/> U.S. EPA <input type="checkbox"/> DOE <input type="checkbox"/> State <input type="checkbox"/> State <input type="checkbox"/> USACE <input type="checkbox"/> NPL Site <b>NRC</b> <input type="checkbox"/> Air Force <input checked="" type="checkbox"/> OSHA <input type="checkbox"/> 10 CFR 20 <input type="checkbox"/> _____ Hazard Communication (Req'd See Attachment D) <input checked="" type="checkbox"/> 1910 <input checked="" type="checkbox"/> 1926 <input type="checkbox"/> State		<b>Safety Officer Manual (Required to be On-Site)</b> Based on the Hazard Assessment and Regulatory Status, determine the Standard HASP(s) applicable to this project. Indicate below which Standard HASP will be used and append the appropriate pages of this form along with the Standard Plan. <input type="checkbox"/> Stack Test <input type="checkbox"/> _____ <input type="checkbox"/> Air Emissions <input type="checkbox"/> _____ <input type="checkbox"/> Asbestos <input type="checkbox"/> _____ <input type="checkbox"/> Industrial Hygiene <input type="checkbox"/> _____ <input type="checkbox"/> _____ <input type="checkbox"/> _____	
Review and Approval Documentation:			
Reviewed by: SO/DSM/CHS <div style="text-align: center;">             Tonya Balla            Name (Print)         </div>		Date: 10/8/10	
Other <div style="text-align: center;">           _____            Name (Print)         </div>		Date: _____	
Approved by: Project Manager <div style="text-align: center;">           Rick Mehl            Name (Print)         </div>		Date: _____	
Hazard Assessment and Equipment Selection:			
In accordance with WESTON's Personal Protective Equipment Program and 29 CFR 1910.132, at the site prior to personnel beginning work, the SHSC and/or the Site Manager have evaluated conditions and verified that the personal protective equipment selection outlined within this HASP is appropriate for the hazards known or expected to exist. (Refer to Safety Officer Manual Section 2, Personal Protection Program, for guidance.)			
<input type="checkbox"/> <b>FSO</b> <div style="text-align: center;">           Trena Seilheimer            Name         </div>		Date: _____	
<input type="checkbox"/> <b>Site Manager</b> <div style="text-align: center;">           _____            Name         </div>		Date: _____	
<input type="checkbox"/> <b>Environmental Compliance Officer</b> <div style="text-align: center;">           _____            Name         </div>		Date: _____	
<input type="checkbox"/> <b>Dangerous Goods Shipping Coordinator</b> <div style="text-align: center;">           _____            Name         </div>		Date: _____	
Project start date: 10-8-10  End date: 12-31-10	This site HASP <b>must</b> be <b>reissued/reapproved</b> for any activities conducted after:  Date: 12-31-10	Amendment date(s) 1. 2. 3. 4. 5.	By:



### Vehicle Use Assessment and Selection

Driving is one of the most hazardous and frequent activities for WESTON Employees. The most appropriate type vehicle(s) authorized for use on this project is/are:

1. SUV
- 2.
- 3.
- 4.

The following Project Team Member's qualifications and experience in driving these types of vehicles was evaluated and found to be acceptable (indicate vehicle type(s) number next to employee name).

1. Trenna Seilheimer
2. Rick Mehl
3. Brian Coninx
- 4.
- 5.

The project site was evaluated and a **Traffic Control Plan** ☐ is required ☒ is not required.

If required, the **Traffic Control Plan** can be found in Attachment H.

The Site is located at 4910 West 86<sup>th</sup> Street in Indianapolis, Marion County, Indiana and is situated in a commercial and industrial setting. The approximately 8-acre Site includes a WWTP consisting of wastewater processing equipment, a sludge treatment building, a sludge treatment process, an oil dehydration process, and a truck off-loading building. The Site is bordered to the north by an industrial property, to the south by West 86<sup>th</sup> Street with commercial properties beyond, and to the east and west by open land. The coordinates for the Site are latitude 39.912866° North and longitude -86.24213° West.

The Site is a provider of liquid waste management services and a recycler of used oil under 40 CFR Part 279. The primary wastewater processing equipment includes API oil/water separators, DAF units, oil storage tanks, sand filters, rotary vacuum filters, plate and frame filter press, and oxidation pit. The facility collects, processes, recovers, and disposes of non-hazardous wastewater, a byproduct of industrial and commercial manufacturing plants. The Site has the capability to treat a variety of non-hazardous liquids and accepts bulk, drum, and containerized liquids. All loads received into the facility are treated and processed to separate contaminants. The water collected during this process is discharged separately into the City of Indianapolis sanitary sewer system and the contaminants are further processed into a form that allows proper recycling or disposal. Any oils recovered from the process are shipped off-site for reclamation. The Site was designed such that all storm water falling in the Site is captured in its internal sewer system and is ultimately run through its wastewater processing equipment prior to being discharged into the City sanitary sewer system.

Over forty storage tanks (waste oil, raw water, sulfuric acid, caustics, hydrogen peroxide, and sludge), separators (oil-water), sumps (oil), and air strippers are located on-site and range in size as outlined below:

- One 1,000,000-gallon Oil Storage Tank currently holds approximately 300,000-gallons of possible PCB containing sludge.
- Two 1,000,000-gallon Raw Water Storage Tanks currently hold a total of approximately 1,500,000-gallons of material (East Tank contains approximately 900,000-gallons of sludge and West Tank contains approximately 600,000-gallons of sludge).
- Other storage tanks range in size from 3,000 to 90,000-gallons and contain waste oil, raw water, sulfuric acid, caustics, hydrogen peroxide, and sludge; however, the volume of material stored in each tank contents is unknown.
- Separator Tanks range in size from 3,000 to 30,000-gallons; however, the exact volume total of contents located on-site is unknown at this time
- Sump is 4,000-gallons; however, the volume total of contents located on-site is unknown at this time
- Air strippers range in size from 5,000 to 30,000-gallons; however, the exact volume total of contents located on-site is unknown at this time

#### 2007 Release Information

A Spill Report dated August 29, 2007, states that a release from the Site occurred on March 15, 2007, during a heavy rain event. The material spilled was untreated oil and water from the Site that entered the City sanitary sewer system via a by-pass sewer (used for permitted special waste), that had been left open. The amount of material released during this event is unknown; however, according to site personnel, it was less than 500-gallons. Due to the heavy rain event, the City sanitary sewers overflowed at several locations in the northern portion of

Indianapolis, which resulted in the deposition of the material and sewerage onto vegetation in residential and commercial areas. The basement of a residence was also impacted at one location.

Contaminated soil and debris was excavated from 25 residential properties and two golf courses. The affected basement was cleaned and the sump pump and hot water heater were replaced at the request of the homeowner. Subsequent to excavation activities, soil samples were collected from the residential properties using a 900 square foot (ft<sup>2</sup>) sampling grid and from the Coffin and Riverside Golf Courses using a 2,500 ft<sup>2</sup> sampling grid. Background samples were also collected at select areas.

Numerous sampling activities were conducted by various agencies from March through June 2007 in the affected areas. Residential soil samples exceeded the IDEM RISC Residential TPH Non-Default Closure Levels for ERO (80 mg/kg). The residential exceedances ranged from 85 to 2,900 mg/kg. Several residential properties had TPH-ERO exceedances subsequent to two separate excavations. IDEM stated the remaining exceedances could stay in place since the soil may be (a) partially attributable to high background levels and (b) better remediated by natural processes including natural degradation and phytoremediation. All TPH results for the golf courses were below the applicable cleanup objectives. It should be noted that several concentrations of arsenic, mercury, chromium, lead, and various VOCs and SVOCs exceeded IDEM RISC Residential/Industrial Soil Default Closure Levels and U.S. EPA Residential/Industrial Soil RSLs. It is unknown if the exceedances are related to the 2007 release.

Wipe sampling was conducted in the basement of a residence using a 1 ft<sup>2</sup> sampling grid. All results were below the applicable cleanup objectives. Residential water well sampling was also conducted with all results below the applicable cleanup objectives with the exception of arsenic (0.012 to 0.016 mg/L) which exceeded the U.S. EPA MCLs. It is unknown if the exceedances are related to the 2007 release. A professional landscaper restored the lawns after the properties had been cleared by sampling results. The course operators restored the golf courses.

A total of 6,000 gallons of oil and water was removed from the north storm sewer cistern and transported to the Site for treatment. A total of 5,800 gallons of oil and water was removed from the Coffin Golf Course Lake and transported to the Site for treatment. A total of 1,600 yards of contaminated soil and debris was removed from impacted areas and transported offsite for disposal. The north storm sewer cistern discovered by IDEM and MCHD and initially identified as a potential source of the release was determined to be a non-functioning sewer and was not the source of the oil from the incident. On April 10, 2007, the pipe from the Site to the cistern was plugged and the cistern was filled with concrete to prevent any possible problems with this structure in the future. On April 17, 2007, the by-pass sewer was permanently sealed with concrete.

#### **2007 PCB Containing Oils Information**

On July 18, 2007, the Site was notified by a customer that it had discovered approximately 28 mg/kg of PCBs in a used oil shipment from the Site. The customer returned the shipment to the Site and it was placed in a segregated holding tank. Samples were collected from each of the product storage frac tanks and other process tanks located at the Site and analyzed for PCBs. The Site discovered that detectable PCBs were present in four loads of oily water from one generator/transporter. All equipment was decontaminated with kerosene beginning on August 1, 2007. The recovered kerosene was transferred to the Oil Storage Tank. In addition to the recovered kerosene, all pumpable materials (liquid and suspended solids) that could be pumped through existing and temporary lines were pumped to this tank. Materials that could not be pumped to this tank were placed in designated frac tanks while recovered centrifuge solids were stored in the Oil Water Separator. These materials were disposed of off-site in July 2008.

From October 2008 to August 2009, approximately 660,000-gallons from Oil Storage Tank were transported off-site for disposal. This tank currently contains approximately 300,000 -gallons of sludge.

#### **2009 Release Information**

Reportedly another release occurred in early 2009. The City-DPW collected background, sludge, and soil samples from various residential and commercial properties in February and April 2009. Residential soil samples exceeded the IDEM RISC Residential TPH Non-Default Closure Levels for ERO (80 mg/kg). The residential exceedances ranged from 230 to 3,800 mg/kg.

#### **Current Information**

In anticipation of the Site being permanently shut down, a Partial Closure Plan was drafted which focuses on managing storm water run-off post shut down to insure that the storm water remains uncontaminated and is properly drained from the Site. The storm water would be directed away from existing process equipment and allowed to flow into "Oil Creek" which runs to the east of the Site. Storm water currently empties into one of the two Raw Water Storage Tanks. In a press release dated September 27, 2010, ESI announced that it would discontinue accepting waste material and end its operations effective September 28, 2010.

# TABLE OF CONTENTS

Section	Page
<b>1. PERSONNEL ON SITE INFORMATION</b>	<b>1-1</b>
1.1 WESTON REPRESENTATIVES .....	1-2
1.2 WESTON SUBCONTRACTORS .....	1-2
1.3 SITE PERSONNEL AND CERTIFICATION STATUS .....	1-3
1.3.1 Weston Employee Certification .....	1-3
1.3.2 Subcontractor's Health and Safety Program Evaluation .....	1-4
<b>2. HEALTH AND SAFETY EVALUATION</b>	<b>2-1</b>
2.1 HEALTH AND SAFETY EVALUATION .....	2-2
2.1.1 Task Hazard Assessment .....	2-2
2.1.2 Chemical Hazards of Concern .....	2-3
2.1.3 Biological Hazards of Concern .....	2-4
2.1.4 Radiation Hazards of Concern .....	2-5
2.1.5 Physical Hazards of Concern .....	2-6
<b>3. TASK BY TASK ASSESMENT</b>	<b>3-1</b>
3.1 TASK-BY-TASK RISK ASSESSMENT .....	3-2
3.1.1 Task 1 Description .....	3-2
3.2 PERSONNEL PROTECTION PLAN .....	3-3
3.3 DESCRIPTION OF LEVELS OF PROTECTION .....	3-4
<b>4. MONITORING PROGRAM</b>	<b>4-1</b>
4.1.1 Air Monitoring Instruments .....	4-2
4.1.1 Air Monitoring Instruments Calibration Record .....	4-3
4.2 SITE AIR MONITORING PROGRAM .....	4-4
4.3 ACTION LEVELS .....	4-5
<b>5. HOSPITAL INFORMATION</b>	<b>5-1</b>
5.1 CONTINGENCIES .....	5-2
5.1.1 Emergency Contacts and Phone Numbers .....	5-2
5.1.2 Hospital Map .....	5-3
5.1.3 Response Plans .....	5-4
<b>6. DECONTAMINATION PLAN</b>	<b>6-1</b>
6.1 GENERAL DECONTAMINATION PLAN .....	6-2
6.2 LEVEL D DECONTAMINATION PLAN .....	6-3
6.3 LEVEL C DECONTAMINATION PLAN .....	6-4
<b>7. TRAINING AND BRIEFING TOPICS/SIGN OFF SHEET</b>	<b>7-1</b>
7.1 TRAINING AND BRIEFING TOPICS .....	7-2
7.2 HEALTH AND SAFETY PLAN APPROVAL/SIGNOFF FORM .....	7-3

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## ATTACHMENTS

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<b>ATTACHMENT A</b>	Chemical Contaminants Data Sheets
<b>ATTACHMENT B</b>	Material Safety Data Sheets
<b>ATTACHMENT C</b>	Safety Procedures/Field Operating Procedures (FLD Ops)
<b>ATTACHMENT D</b>	Hazard Communication Program
<b>ATTACHMENT E</b>	Air Sampling Data Sheets
<b>ATTACHMENT F</b>	Incident Reporting
<b>ATTACHMENT G</b>	AHA Checklist and Environmental Compliance
<b>ATTACHMENT H</b>	Traffic Control Plan
<b>ATTACHMENT I</b>	Audit Forms
<b>ATTACHMENT J</b>	Environmental Health & Safety Inspection Checklist
<b>ATTACHMENT K</b>	Environmental Protection and Sustainability Program Impact Checklist

## **1. PERSONNEL ON SITE INFORMATION**

## 1.1 WESTON REPRESENTATIVES

Organization/Branch	Name/Title	Address	Telephone
Weston Solutions, Inc VHI	Tonya Balla H&S Manager	750 E Bunker Ct, Ste 500 Vernon Hills, IL	847-918-4094 847-528-2623
Weston Solutions, Inc CHI	Rick Mehl Project Manager/Field	20 N Wacker Dr, Ste 1210 Chicago, IL	312-424-3312 847-254-6981
Weston Solutions, Inc CHI	Trenna Seilheimer Field Personnel	20 N Wacker Dr, Ste 1210 Chicago, IL	312-424-3314 260-348-4911
Weston Solutions, Inc VHI	Brian Coninx Field Personnel	750 E Bunker Ct, Ste 500 Vernon Hills, IL	847-918-4006 847-609-0766

### Roles and Responsibilities:

T. Balla – H&S Manager  
Field Personnel – Perform sampling activities as outlined

## 1.2 WESTON SUBCONTRACTORS

Organization/Branch	Name/Title	Address	Telephone
	Name: Title:	Street: City: State, Zip:	
	Name: Title:	Street: City: State, Zip:	
	Name: Title:	Street: City: State, Zip:	

### Roles and Responsibilities:

## SITE-SPECIFIC HEALTH AND SAFETY PERSONNEL

The Site Field Safety Officer (FSO) for activities to be conducted at this site is: Trenna Seilheimer

The FSO has total responsibility for ensuring that the provisions of this Site HASP are adequate and implemented in the field.

Changing field conditions may require decisions to be made concerning adequate protection programs. Therefore, the personnel assigned as FSOs are experienced and meet the additional training requirements specified by OSHA in 29 CFR 1910.120.

### Qualifications:

40hr HAZWOPER with current 8hr Refresher, Fit test  
8hr SHSC/FSO Training  
Current Medical Clearance  
First Aid-CPR Training

**Designated alternates include:** Rick Mehl

## 1.3 SITE PERSONNEL AND CERTIFICATION STATUS

### 1.3.1 Weston Employee Certification

<b>Name:</b> Rick Mehl <b>Title:</b> Field Personnel <b>Task(s):</b> 1 <b>Certification Level or Description:</b> <input checked="" type="checkbox"/> Medical Current <input checked="" type="checkbox"/> Training Current <input type="checkbox"/> Fit Test Current (Qual.) <input checked="" type="checkbox"/> Fit Test Current (Quant.)	<b>Name:</b> Trenna Seilheimer <b>Title:</b> Field Personnel <b>Task(s):</b> 1 <b>Certification Level or Description:</b> <input checked="" type="checkbox"/> Medical Current <input checked="" type="checkbox"/> Training Current <input type="checkbox"/> Fit Test Current (Qual.) <input checked="" type="checkbox"/> Fit Test Current (Quant.)
<b>Name:</b> Brian Coninx <b>Title:</b> Field Personnel <b>Task(s):</b> 1 <b>Certification Level or Description:</b> <input checked="" type="checkbox"/> Medical Current <input checked="" type="checkbox"/> Training Current <input type="checkbox"/> Fit Test Current (Qual.) <input checked="" type="checkbox"/> Fit Test Current (Quant.)	<b>Name:</b> <b>Title:</b> <b>Task(s):</b> <b>Certification Level or Description:</b> <input type="checkbox"/> Medical Current <input type="checkbox"/> Training Current <input type="checkbox"/> Fit Test Current (Qual.) <input type="checkbox"/> Fit Test Current (Quant.)
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**TRAINING CURRENT - Training:** All personnel, including visitors, entering the exclusion or contamination reduction zones must have certifications of completion of training in accordance with OSHA 29 CFR 1910, 29 CFR 1926, or 29 CFR 1910.120.

**FIT TEST CURRENT - Respirator Fit Testing:** All persons, including visitors, entering any area requiring the use or potential use of any negative pressure respirator must have had, as a minimum, a qualitative fit test, administered in accordance with OSHA 29 CFR 1910.134 or ANSI, within the last 12 months. If site conditions require the use of a full-face, negative-pressure, air-purifying respirator for protection from asbestos or lead, employees must have had a qualitative fit test, administered according to OSHA 29 CFR 1910.1001 or 1025/1926, within the last 6 months.

**MEDICAL CURRENT - Medical Monitoring Requirements:** All personnel, including visitors, entering the exclusion or contamination reduction zones must be certified as medically fit to work and to wear a respirator, if appropriate, in accordance with 29 CFR 1910, 29 CFR 1926/1910, or 29 CFR 1910.120.

The Site Field Safety Officer is responsible for verifying all certifications and fit tests.

## SITE PERSONNEL AND CERTIFICATION STATUS

### 1.3.2 Subcontractor's Health and Safety Program Evaluation

**Name of Subcontractor:**

**Address:**

**Activities To Be Conducted by Subcontractor:**

#### Evaluation Criteria

Medical program meets OSHA/WESTON criteria

- ☐ Acceptable  
☐ Unacceptable

Comments:

Personal protective equipment available

- ☐ Acceptable  
☐ Unacceptable

Comments:

On-site monitoring equipment available, calibrated, and operated properly

- ☐ Acceptable  
☐ Unacceptable

Comments:

Safe working procedures clearly specified

- ☐ Acceptable  
☐ Unacceptable

Comments:

Training meets OSHA/WESTON criteria

- ☐ Acceptable  
☐ Unacceptable

Comments:

Emergency procedures

- ☐ Acceptable  
☐ Unacceptable

Comments:

Decontamination procedures

- ☐ Acceptable  
☐ Unacceptable

Comments:

General health and safety program evaluation

- ☐ Acceptable  
☐ Unacceptable

Comments:

Additional comments:

- ☐ Subcontractor has agreed to and will conform with the WESTON HASP for this project.
- ☐ Subcontractor will work under his own HASP, which has been accepted by project PM.

**Evaluation Conducted by:** Certifications for all subcontractors personnel will be added to the HASP prior to beginning work.

**Date:**

#### Subcontractor

**Name:**

**Title:**

**Task(s):**

**Certification Level or Description:**

- ☐ Medical Current ☐ Training Current  
☐ Fit Test Current (Qual.) ☐ Fit Test Current (Quant.)

**Name:**

**Title:**

**Task(s):**

**Certification Level or Description:**

- ☐ Medical Current ☐ Training Current  
☐ Fit Test Current (Qual.) ☐ Fit Test Current (Quant.)

**Name:**

**Title:**

**Task(s):**

**Certification Level or Description:**

- ☐ Medical Current ☐ Training Current  
☐ Fit Test Current (Qual.) ☐ Fit Test Current (Quant.)

**Name:**

**Title:**

**Task(s):**

**Certification Level or Description:**

- ☐ Medical Current ☐ Training Current  
☐ Fit Test Current (Qual.) ☐ Fit Test Current (Quant.)



## **2. HEALTH AND SAFETY EVALUATION**

## 2.1 HEALTH AND SAFETY EVALUATION

### 2.1.1 Task Hazard Assessment

Background Review: ☒ Complete ☐ Partial If partial why?

#### Activities Covered Under This Plan:

No.	Task/Subtask	Description	Schedule
1		Sampling Activities	1-2 days

#### Types of Hazards:

Numbers refer to one of the following hazard evaluation forms. Complete hazard evaluation forms for each appropriate hazard class.

#### Physiochemical 1

- ☒ Flammable
- ☐ Explosive
- ☒ Corrosive
- ☐ Reactive
- ☐ O<sub>2</sub> Rich
- ☐ O<sub>2</sub> Deficient

#### Chemically Toxic 1

- ☐ Inhalation ☐ Carcinogen
- ☐ Ingestion ☐ Mutagen
- ☒ Contact ☐ Teratogen
- ☐ Absorption
- ☐ OSHA 1910.1000 Substance (Air Contaminants)
- ☐ OSHA Specific Hazard Substance Standard (Refer to following page for listing)

#### Radiation 3

- Ionizing:
  - ☐ Internal exposure
  - ☐ External exposure
- Non-ionizing:
  - ☒ UV ☐ IR
  - ☐ RF ☐ MicroW
  - ☐ Laser

#### Biological 2

- ☐ Etiological Agent
- ☒ Other (plant, insect, animal)

#### Physical Hazards 4

- ☐ Construction Activities

#### Source/Location of Contaminants and Hazardous Substances:

#### Directly Related to Tasks

- ☐ Air
- ☐ Other Surface
- ☐ Groundwater
- ☐ Soil
- ☐ Surface Water
- ☐ Sanitary Wastewater
- ☒ Process Wastewater
- ☒ Other misc storage tanks

#### Indirectly Related to Tasks — Nearby Process(es) That Could Affect Team Members:

- ☐ Client Facility/WESTON Work Location
- ☐ Nearby Non-Client Facility

Describe:

- ☒ Have activities (task[s]) been coordinated with facility?

Comments:

**Activities are being coordinated by U.S. EPA OSC Verneta Simon.**

## HEALTH AND SAFETY EVALUATION

### 2.1.2 Chemical Hazards of Concern

☐ **N/A**

Chemical Contaminants of Concern

Provide the data requested for chemical contaminants on HASP Form 25 or attach data sheets from an acceptable source such as NIOSH pocket guide, condensed chemical dictionary, ACGIH TLV booklet, etc. List chemicals and concentrations below and locate data sheets in Attachment B of this HASP.

☐ **N/A**

Identify hazardous materials used or on-site and attach Material Safety Data Sheets (MSDSs) for all reagent type chemicals, solutions, or other identified materials that in normal use in performing tasks related to this project could produce hazardous substances. Ensure that all subcontractors and other parties working nearby are informed of the presence of these chemicals and the location of the MSDSs. Obtain from subcontractors and other parties, lists of the hazardous materials they use or have on-site and identify location of the MSDSs here. List chemicals and quantities below and locate MSDSs in Attachment B of this HASP.

Chemical Name	Concentration ( )	Chemical Name	Quantity
One 1,000,000-gallon Oil Storage Tank currently holds approximately 300,000-gallons of possible PCB containing sludge	Unknown	Alconox	Small bag
Two 1,000,000-gallon Raw Water Storage Tanks currently hold a total of approximately 1,500,000-gallons of material	Unknown	Calibration Gases for MultiRAE	
Other storage tanks range in size from 3,000 to 90,000-gallons and contain waste oil, raw water, sulfuric acid, caustics, hydrogen peroxide, and sludge	Unknown		
Separator Tanks range in size from 3,000 to 30,000-gallons	Unknown		
Sump is 4,000-gallons	Unknown		
Air strippers range in size from 5,000 to 30,000-gallons	Unknown		
~400 gallons of 50% hydrogen peroxide several hundred gallons of concentrated sulfuric acid ~4100 gallons of 50% sodium hydroxide solution tote of 30-60% sodium hydrosulfide 50% iron sulfate drums of bleach (sodium hypochlorite) polymers and demulsifiers, diesel fuel, lab reagents, soda ash, boiler chemicals, solvent-based paints and citric acid	Unknown		

### OSHA-SPECIFIC HAZARDOUS SUBSTANCES

<input type="checkbox"/> 1910.1001 Asbestos	<input type="checkbox"/> 1910.1002 Coal tar pitch volatiles	<input type="checkbox"/> 1910.1003 4-Nitrobiphenyl, etc.	<input type="checkbox"/> 1910.1004 alpha-Naphthylamine
<input type="checkbox"/> 1910.1005 [Reserved]	<input type="checkbox"/> 1910.1006 Methyl chloromethyl ether	<input type="checkbox"/> 1910.1007 3,3'-Dichlorobenzidine (and its salts)	<input type="checkbox"/> 1910.1008 bis-Chloromethyl ether
<input type="checkbox"/> 1910.1009 beta-Naphthylamine	<input type="checkbox"/> 1910.1010 Benzidine	<input type="checkbox"/> 1910.1011 4-Aminodiphenyl	<input type="checkbox"/> 1910.1012 Ethyleneimine
<input type="checkbox"/> 1910.1013 beta-Propiolactone	<input type="checkbox"/> 1910.1014 2-Acetylaminofluorene	<input type="checkbox"/> 1910.1015 4-Dimethylaminoazobenzene	<input type="checkbox"/> 1910.1016 N-Nitrosodimethylamine
<input type="checkbox"/> 1910.1017 Vinyl chloride	<input type="checkbox"/> 1910.1018 Inorganic arsenic	<input type="checkbox"/> 1910.1025 Lead (Att. FLD# 46)	<input type="checkbox"/> 1910.1026 Chromium VI (att. FLD 53)
<input type="checkbox"/> 1910.1027 Cadmium (Att. 50 FLD)	<input type="checkbox"/> 1910.1028 Benzene (Att. FLD# 54 or 61)	<input type="checkbox"/> 1910.1029 Coke oven emissions	<input type="checkbox"/> 1910.1043 Cotton dust
<input type="checkbox"/> 1910.1044 1,2-Dibromo-3-chloropropane	<input type="checkbox"/> 1910.1045 Acrylonitrile	<input type="checkbox"/> 1910.1047 Ethylene oxide	<input type="checkbox"/> 1910.1048 Formaldehyde
<input type="checkbox"/> 1910.1050 Methylenedianiline	<input type="checkbox"/> 1910.1051 1,3 Butadiene	<input type="checkbox"/> 1910.1052 Methylene chloride	<input type="checkbox"/> 1926.60 Methylenedianiline
<input type="checkbox"/> 1926.62 Lead	<input type="checkbox"/> 1926.1101 Asbestos (Att. FLD 52)	<input type="checkbox"/> 1926.1127 Cadmium	

<b>HEALTH AND SAFETY EVALUATION</b>	
<b>2.1.3 Biological Hazards of Concern</b>	
<input checked="" type="checkbox"/> <b>Poisonous Plants</b> (FLD 43-D)  Location/Task No(s) <b>1</b> Source: <input type="checkbox"/> Known <input checked="" type="checkbox"/> Suspect Route of Exposure: <input type="checkbox"/> Inhalation <input type="checkbox"/> Ingestion <input checked="" type="checkbox"/> Contact <input type="checkbox"/> Direct Penetration  Team Member(s) Allergic: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Immunization required: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input checked="" type="checkbox"/> <b>Insects</b> (FLD 43-B)  Location/Task No(s) <b>1</b> Source: <input type="checkbox"/> Known <input checked="" type="checkbox"/> Suspect Route of Exposure: <input type="checkbox"/> Inhalation <input type="checkbox"/> Ingestion <input type="checkbox"/> Contact <input checked="" type="checkbox"/> Direct Penetration  Team Member(s) Allergic: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Immunization required: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<input checked="" type="checkbox"/> <b>Snakes, Reptiles</b> (FLD 43-A)  Location/Task No(s) <b>1</b> Source: <input type="checkbox"/> Known <input checked="" type="checkbox"/> Suspect Route of Exposure: <input type="checkbox"/> Inhalation <input type="checkbox"/> Ingestion <input type="checkbox"/> Contact <input checked="" type="checkbox"/> Direct Penetration  Team Member(s) Allergic: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Immunization required: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input checked="" type="checkbox"/> <b>Animals</b> (FLD 43-A)  Location/Task No(s) <b>1</b> Source: <input type="checkbox"/> Known <input checked="" type="checkbox"/> Suspect Route of Exposure: <input type="checkbox"/> Inhalation <input type="checkbox"/> Ingestion <input type="checkbox"/> Contact <input checked="" type="checkbox"/> Direct Penetration  Team Member(s) Allergic: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Immunization required: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
FLD 43 — WESTON Biohazard Field Operating Procedures: Att. OP <input type="checkbox"/>	
<input type="checkbox"/> <b>Sewage</b>  Location/Task No(s).: Source: <input type="checkbox"/> Known <input type="checkbox"/> Suspect Route of Exposure: <input type="checkbox"/> Inhalation <input type="checkbox"/> Ingestion <input type="checkbox"/> Contact <input type="checkbox"/> Direct Penetration  Team Member(s) Allergic: <input type="checkbox"/> Yes <input type="checkbox"/> No Immunization required: <input type="checkbox"/> Yes <input type="checkbox"/> No  Tetanus Vaccination within Past 10 yrs: <input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> <b>Etiologic Agents</b> (FLD -C)(List)  Location/Task No(s).: Source: <input type="checkbox"/> Known <input type="checkbox"/> Suspect Route of Exposure: <input type="checkbox"/> Inhalation <input type="checkbox"/> Ingestion <input type="checkbox"/> Contact <input type="checkbox"/> Direct Penetration  Team Member(s) Allergic: <input type="checkbox"/> Yes <input type="checkbox"/> No Immunization required: <input type="checkbox"/> Yes <input type="checkbox"/> No
FLD 43-C — Mold and Fungus. Att. OP <input type="checkbox"/>	
FLD 44 — WESTON Bloodborne Pathogens Exposure Control Plan – First Aid Procedures: Att. OP <input checked="" type="checkbox"/>	
FLD 45 — WESTON Bloodborne Pathogens Exposure Control Plan – Working with Infectious Waste: Att. OP <input type="checkbox"/>	

HEALTH AND SAFETY EVALUATION								
2.1.4 Radiation Hazards of Concern								
NONIONIZING RADIATION								
Task No.	Type of Nonionizing Radiation	Source On-Site	TLV/PEL	Wavelength Range	Control Measures	Monitoring Instrument		
1	Ultraviolet	Solar			Appropriate clothing/sunscreen	None		
	Infrared	N/A						
	Radio Frequency	N/A						
	Microwave	N/A						
	Laser	N/A						
IONIZING RADIATION								
Task No.	Radionuclide	Major Radiations	Radioactive Half-Life (Years)	DAC ( $\mu\text{Ci}/\text{mL}$ )			Surface Contamination Limit	Monitoring Instrument
				D	W	Y		

# HEALTH AND SAFETY EVALUATION

## 2.1.5 Physical Hazards of Concern

Physical Hazard Condition	Physical Hazard	Attach OP	WESTON OP Titles
Loud noise	Hearing loss/disruption of communication	<input type="checkbox"/>	Section 7.0 - ECH&S Program Manual Occupational Noise & HC Program
Inclement weather	Rain/humidity/cold/ice/snow/lightning	<input checked="" type="checkbox"/>	FLD02 - Inclement Weather
Steam heat stress	Burns/displaced oxygen/wet working surfaces	<input type="checkbox"/>	FLD03 - Hot Process - Steam
Heat stress	Burns/hot surfaces/low pressure steam	<input type="checkbox"/>	FLD04 - Hot Process - LT3
Ambient heat stress	Heat rash/cramps/exhaustion/heat stroke	<input checked="" type="checkbox"/>	FLD05 - Heat Stress Prevention/Monitoring
Cold stress	Hypothermia/frostbite	<input checked="" type="checkbox"/>	FLD06 - Cold Stress
Cold/wet	Trench/paddy/immersion foot/edema	<input checked="" type="checkbox"/>	FLD02 - Inclement Weather
Confined spaces	Falls/burns/drowning/engulfment/electrocution	<input type="checkbox"/>	FLD08 - Confined Space Entry
Industrial Trucks	Fork Lift Truck Safety	<input type="checkbox"/>	FLD09 - Powered Industrial Trucks
Improper lifting	Back strain/abdomen/arm/leg muscle/joint injury	<input type="checkbox"/>	FLD10 - Manual Lifting/Handling Heavy Objects
Uneven surfaces	Vehicle accidents/slips/trips/falls	<input checked="" type="checkbox"/>	FLD11 - Rough Terrain
Poor housekeeping	Slips/trips/falls/punctures/cuts/fires	<input checked="" type="checkbox"/>	FLD12 - Housekeeping
Structural integrity	Crushing/overhead hazards/compromised floors	<input checked="" type="checkbox"/>	FLD13 - Structural Integrity
Improper cylinder. handling	Mechanical injury/fire/explosion/suffocation	<input type="checkbox"/>	FLD16 - Pressure Systems - Compressed Gases
Water hazards	Poor visibility/entanglement/drowning/cold stress	<input type="checkbox"/>	FLD17 - Diving
Water hazards	Drowning/heat/cold stress/hypothermia/falls	<input type="checkbox"/>	FLD18 - Operation and Use of Boats
Water hazards	Drowning/frostbite/hypothermia/falls/electrocution	<input type="checkbox"/>	FLD19 - Working Over Water
Vehicle hazards	Struck by vehicle/collision	<input type="checkbox"/>	FLD20 - Traffic
Explosions	Explosion/fire/thermal burns	<input type="checkbox"/>	FLD21 - Explosives
Moving mechanical parts	Crushing/pinch points/overhead hazards/electrocution	<input type="checkbox"/>	FLD22 - Earth Moving Equipment
Moving mech. parts	Overhead hazards/electrocution	<input type="checkbox"/>	FLD23 - Cranes, Rigging, and Slings
Working at elevation	Overhead hazards/falls/electrocution	<input type="checkbox"/>	FLD24 - Aerial Lifts/Man lifts
Working at elevation	Overhead hazards/falls/electrocution	<input checked="" type="checkbox"/>	FLD25 - Working at Elevation
Working at elevation	Overhead hazards/falls/electrocution/slips	<input checked="" type="checkbox"/>	FLD26 - Ladders
Working at elevation	Slips/trips/falls/overhead hazards	<input type="checkbox"/>	FLD27 - Scaffolding
Trench cave-in	Crushing/falling/overhead hazards/suffocation	<input type="checkbox"/>	FLD28 - Excavating/Trenching
Physiochemical	Explosions/fires from oxidizing, flam./corr. material	<input checked="" type="checkbox"/>	FLD30 - Hazardous Materials Use/Storage
Physiochemical	Fire and explosion	<input type="checkbox"/>	FLD31 - Fire Prevention/Response Plan Required
Physiochemical	Fire	<input checked="" type="checkbox"/>	FLD32 - Fire Extinguishers Required
Structural integrity	Overhead/electrocution/slips/trips/falls/fire	<input type="checkbox"/>	FLD33 - Demolition
Electrical	Electrocution/shock/thermal burns	<input type="checkbox"/>	FLD34 - Utilities
Electrical	Electrocution/shock/thermal burns	<input type="checkbox"/>	FLD35 - Electrical Safety
Burns/fires	Heat stress/fires/burns	<input type="checkbox"/>	FLD36 - Welding/Cutting/Brazing/Radiography
Impact/thermal	Thermal burns/high pressure impaction/heat stress	<input type="checkbox"/>	FLD37 - Pressure Washers/Sand Blasting
Impaction/electrical	Smashing body parts/pinching/cuts/electrocution	<input checked="" type="checkbox"/>	FLD38 - Hand and Power Tools
Poor visibility	Slips/trips/falls	<input checked="" type="checkbox"/>	FLD39 - Illumination
Fire/explosion	Burns/impaction	<input type="checkbox"/>	FLD40 - Storage Tank Removal/Decommissioning
Communications	Disruption of communications	<input checked="" type="checkbox"/>	FLD41 - Std. Hand/Emergency Signals
Energy/release	Unexpected release of energy	<input type="checkbox"/>	FLD42 - Lockout/Tag-out
Biological Hazards	Biological Hazards at site	<input checked="" type="checkbox"/>	FLD43 - Biological Hazards
Animals	Animals	<input checked="" type="checkbox"/>	FLD43A - Animals
Insects	Stinging and Biting Insects	<input checked="" type="checkbox"/>	FLD43B - Stinging and Biting Insects
Molds/Fungi	Molds and Fungi	<input type="checkbox"/>	FLD43C - Molds and Fungi
Hazardous Plants	Hazardous Plants	<input checked="" type="checkbox"/>	FLD43D - Hazardous Plants
Etiologic Agents	Etiologic Agents	<input type="checkbox"/>	FLD43E - Etiologic Agents

Biological Hazards/BBP	Biological Hazards/BBP at site/First Aid Providers	<input checked="" type="checkbox"/>	FLD44 - Biological Hazards – Bloodborne Pathogens Exposure Control Plan – First Aid Providers
<b>2.1.5 Physical Hazards of Concern (Continued)</b>			
Physical Hazard Condition	Physical Hazard	Attach OP	WESTON OP Titles
Infectious Waste	Infectious Waste at site/BBP/ at site/Infectious Waste	<input type="checkbox"/>	FLD45 – Biological Hazards – Bloodborne Pathogens Exposure Control Plan – Work With Infectious Waste
Lead Contaminated sites	Lead poisoning	<input type="checkbox"/>	FLD46 - Control of Exposure to Lead
Puncture/cuts	Cuts/ dismemberment/gouges	<input type="checkbox"/>	FLD47 - Clearing, Grubbing and Logging Operations
Not applicable	Not applicable	<input type="checkbox"/>	FLD48 – Federal, State, Local Regulatory Agency Inspections
Not applicable	Exposure to hazardous materials/waste	<input type="checkbox"/>	FLD49 – Safe Storage of Samples
Cadmium	Exposure Control	<input type="checkbox"/>	FLD50 – Cadmium Exposure Control Plan
Process Safety Procedure	Safety Procedure	<input type="checkbox"/>	FLD51 – Process Safety Procedure
Asbestos	Asbestos Exposure	<input type="checkbox"/>	FLD52 – Asbestos Exposure Control Plan
Hexavalent Chromium	Exposure Control Plan	<input type="checkbox"/>	FLD53 – Hexavalent Chromium Exposure Control Plan
Benzene	Exposure Control Plan	<input type="checkbox"/>	FLD54 - <u>Benzene Exposure Control Plan</u>
Hydrofluoric acid	Working with HF	<input type="checkbox"/>	FLD55 – Working with Hydrofluoric Acid
Moving drill rig parts	Crushing/pinch points/overhead hazards/electrocution	<input type="checkbox"/>	FLD56 – Drilling Safety
Vehicles/driving	Accidents,/fatigue/cell phone use	<input checked="" type="checkbox"/>	FLD 57 – Motor Vehicle Safety
Improper material handling	Back injury/crushing from load shifts/equipment/tools	<input checked="" type="checkbox"/>	FLD 58 – Drum Handling Operations
COC decontamination	COCs/slip,trip, and falls/waste generation/environmental compliance/PPE	<input checked="" type="checkbox"/>	FLD59 - Decontamination
Drilling hazards	Electrocution/overhead hazards/pinch points	<input type="checkbox"/>	Environmental Remediation Drilling Safety Guideline - 2005
Fatigue	Long work hours	<input checked="" type="checkbox"/>	FLD60 – Employee Duty Schedule
Benzene/Gasoline	Benzene exposure	<input type="checkbox"/>	FLD61 – Gasoline Contaminant Exposure

### **3. TASK BY TASK ASSESMENT**



## 3.1 TASK-BY-TASK RISK ASSESSMENT

### 3.1.1 Task 1 Description

**TASK 1:** Sampling of over 40 existing storage tanks. Sample media could be sludge or liquid. START and ERRS will conduct sampling/HAZCAT. Utilizing bomb sampler, dedicated disposable bailers, drum thieves, dedicated disposable scoops or from sampling valve/port. AT NO TIME WILL START ENTER ANY TANKS. START will be working with ERRs to perform this tasking.

Complete general inventory completed during sampling activities.

All locations inspected prior to opening or sampling. Inspections include condition of storage container and any identifying labels.

A Multi-Rae will be onsite.

All samples placed in the designated sampling container.

All information regarding inspections, monitoring, and sampling recorded in logbook/field data sheets.

All samples maintained at 4°C with ice after sample collection.

Fresh sampling gloves donned prior to commencing sampling at each new sampling location.

#### EQUIPMENT REQUIRED/USED

Level D PPE modified MultiRAE Bomb Sampler Bailers Drum Thieves	Plastic Scoops HAZCAT ColiWasa SludgeJudge Eckman	Level C (if needed) camera Log book Nitrile gloves Safety glasses
---	---	---

#### POTENTIAL HAZARDS/RISKS

##### Chemical

☒ Hazard Present      Risk Level: ☐ H    ☒ M    ☐ L      What justifies risk level?  
Over 40 storage tanks located onsite.

- One 1,000,000-gallon Oil Storage Tank currently holds approximately 300,000-gallons of possible PCB containing sludge
- Two 1,000,000-gallon Raw Water Storage Tanks currently hold a total of approximately 1,500,000-gallons of material
- Other storage tanks range in size from 3,000 to 90,000-gallons and contain waste oil, raw water, sulfuric acid, caustics, hydrogen peroxide, and sludge; however, the volume of material stored in each tank contents is unknown
- Separator Tanks range in size from 3,000 to 30,000-gallons; however, the exact volume total of contents located on-site is unknown at this time
- Sump is 4,000-gallons; however, the volume total of contents located on-site is unknown at this time
- Air strippers range in size from 5,000 to 30,000-gallons; however, the exact volume total of contents located on-site is unknown at this time

Personnel will work upwind when possible. Personnel will use sampling procedures to minimize splash hazard.

##### Physical

☒ Hazard Present      Risk Level: ☐ H    ☐ M    ☒ L      What justifies risk level?  
Inclement weather, rough terrain, remote area, slip/trip/fall, possible hazardous materials use/storage, ladder, and hand/power tools. The Site is closed and has no electricity; however, seems secure. Personnel will use backpack to carry supplies up ladder, as appropriate – using 3 point climbing technique. Personnel will monitor for heat/cold stress and stay hydrated. Personnel will work in a buddy system at all time.

##### Biological

☒ Hazard Present      Risk Level: ☐ H    ☐ M    ☒ L      What justifies risk level?  
Plants, insects, animals. Biological hazards should be minimal due to the time of year.

##### RADIOLOGICAL

☒ Hazard Present      Risk Level: ☐ H    ☐ M    ☒ L      What justifies risk level?  
UV rays. Personnel will wear PPE and/or sunscreen as appropriate to address uv rays.

#### LEVELS OF PROTECTION/JUSTIFICATION

**Level D PPE Modified will be utilized for open-top storage tank sampling-tanks in open atmosphere**

**Level C PPE will be utilized for drum sampling**

**No unknown drums/tanks will be sampled by START. START will not sample acids.**

#### SAFETY PROCEDURES REQUIRED AND/OR FIELD OPS UTILIZED

All work will be performed in accordance with the provisions of this HASP, OSHA guidelines, and WESTON Standard Operating Procedures. See FLDs. Implement buddy system.

## 3.2 PERSONNEL PROTECTION PLAN

### Engineering Controls

Describe Engineering Controls used as part of Personnel Protection Plan:

#### Task(s)

- 1 Proper tools will be used

### Administrative Controls

Describe Administrative Controls used as part of Personnel Protection Plan:

#### Task(s)

- 1 Personnel has appropriate qualifications and training  
 1 Proper breaks will be taken  
 1 Plenty of fluids will be taken while working on-site  
 1 Proper clothing will be worn for weather conditions present

### Personal Protective Equipment

Action Levels for Changing Levels of Protection. Refer to HASP Form 13, Site Air Monitoring Program—Action Levels. Define Action Levels for up or down grade for each task:

#### Task(s)

- 1 Level D Modified for sampling open-top storage tanks  
 1 Level C if sampling drums or if elevated readings

### Description of Levels of Protection

Level D	Level D Modified
<b>Task(s):</b> <input type="checkbox"/> Head <input type="checkbox"/> Eye and Face  <input type="checkbox"/> Hearing <input type="checkbox"/> Arms and Legs Only <input type="checkbox"/> Appropriate Work Uniform <input type="checkbox"/> Hand – Gloves <input type="checkbox"/> Foot - Safety Boots <input type="checkbox"/> Fall Protection <input type="checkbox"/> Flotation <input type="checkbox"/> Other	<b>Task(s): 1</b> <input checked="" type="checkbox"/> Head Hard hat <input checked="" type="checkbox"/> Eye and Face Safety glasses/ goggles or Face Shield (if appropriate)  <input type="checkbox"/> Hearing <input type="checkbox"/> Arms and Legs Only <input checked="" type="checkbox"/> Whole Body Saranex <input type="checkbox"/> Apron <input checked="" type="checkbox"/> Hand - Gloves Nitrile <input checked="" type="checkbox"/> Gloves Nitrile <input type="checkbox"/> Gloves <input checked="" type="checkbox"/> Foot - Safety Boots Steel-toe <input checked="" type="checkbox"/> Over Boots Booties

### 3.3 DESCRIPTION OF LEVELS OF PROTECTION

Level C		Level B
<b>Task(s): 1</b>		<b>Task(s):</b>
<input checked="" type="checkbox"/> Head	Hard hat	<input type="checkbox"/> Head
<input checked="" type="checkbox"/> Eye and Face	Safety glasses/Face Shield (if appropriate)	<input type="checkbox"/> Eye and Face
<input type="checkbox"/> Hearing		<input type="checkbox"/> Hearing
<input type="checkbox"/> Arms and Legs Only		<input type="checkbox"/> Arms and Legs Only
<input checked="" type="checkbox"/> Whole Body	Saranex	<input type="checkbox"/> Whole Body
<input type="checkbox"/> Apron		<input type="checkbox"/> Apron
<input checked="" type="checkbox"/> Hand – Gloves	Nitrile	<input type="checkbox"/> Hand - Gloves
<input checked="" type="checkbox"/> Gloves	Nitrile	<input type="checkbox"/> Gloves
<input type="checkbox"/> Gloves		<input type="checkbox"/> Gloves
<input checked="" type="checkbox"/> Foot - Safety Boots	Steel-toe	<input type="checkbox"/> Foot - Safety Boots
<input checked="" type="checkbox"/> Outer Boots	Booties	<input type="checkbox"/> Outer Boots
<input type="checkbox"/> Boots (Other)		<input type="checkbox"/> Boots (Other)
<input type="checkbox"/> Half Face		<input type="checkbox"/> SAR - Airline
<input type="checkbox"/> Cart./Canister		<input type="checkbox"/> SCBA
<input checked="" type="checkbox"/> Full Face	APR	<input type="checkbox"/> Comb. Airline/SCBA
<input checked="" type="checkbox"/> Cart./Canister	GME/P-100	<input type="checkbox"/> Cascade System
<input type="checkbox"/> PAPR		<input type="checkbox"/> Compressor
<input type="checkbox"/> Cart./Canister		<input type="checkbox"/> Fall Protection
<input type="checkbox"/> Type C		<input type="checkbox"/> Flotation
<input type="checkbox"/> Fall Protection		<input type="checkbox"/> Other
<input type="checkbox"/> Flotation		
<input type="checkbox"/> Other		

## **4. MONITORING PROGRAM**

## 4.1 SITE OR PROJECT HAZARD MONITORING PROGRAM

### 4.1.1 Air Monitoring Instruments

#### Instrument Selection and Initial Check Record

Reporting Format: ☒ Field Notebook ☐ Field Data Sheets\* ☐ Air Monitoring Log ☐ Trip Report ☐ Other

Instrument	Task No.(s)	Number Required	Number Received	Checked Upon Receipt	Comment	Initials
<input type="checkbox"/> <b>RAD</b> <input type="checkbox"/> GM (Pancake) <input type="checkbox"/> NaI (Micro R) <input type="checkbox"/> ZnS (Alpha Scintillator) <input type="checkbox"/> Other _____				<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		
<input checked="" type="checkbox"/> <b>PID</b> <input type="checkbox"/> MiniRAE <input checked="" type="checkbox"/> MultiRAE (LEL/O2/H2S/CO/PID) <input type="checkbox"/> TVA 1000 (PID/FID) <input type="checkbox"/> Other _____	1	1		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		
<input type="checkbox"/> <b>FID</b> <input type="checkbox"/> TVA 1000 (FID/PID) <input type="checkbox"/> Other _____				<input type="checkbox"/> <input type="checkbox"/>		
<input type="checkbox"/> <b>PDR 1000 (Particulate)</b>				<input type="checkbox"/>		
<input type="checkbox"/> <b>Single Gas Meter (SGM)</b> Specify Chemical:				<input type="checkbox"/> <input type="checkbox"/>		
<input type="checkbox"/> <b>Personal Sampling Pump</b> Specify Media:				<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		
<input type="checkbox"/> <b>Detector Tube Pump:</b> Specify (MSA, Dräger, Sensidyne)				<input type="checkbox"/>		
<input type="checkbox"/> Tubes/type: _____ <input type="checkbox"/> Tubes/type: _____ <input type="checkbox"/> Tubes/type: _____ <input type="checkbox"/> Tubes/type: _____						

#### 4.1 SITE OR PROJECT HAZARD MONITORING PROGRAM

#### 4.1.1 Air Monitoring Instruments Calibration Record

[illegible]

4.2 SITE AIR MONITORING PROGRAM				
Action Levels				
These Action Levels, if not defined by regulation, are some percent (usually 50%) of the applicable PEL/TLV/REL. That number must also be adjusted to account for instrument response factors.				
	Tasks	Action Level		Action
<input checked="" type="checkbox"/> Explosive atmosphere	1	Ambient Air Concentration	Confined Space Concentration	
		<10% LEL	0 to 1% LEL	Work may continue. Consider toxicity potential.
		10 to 25% LEL	1 to 10% LEL	Work may continue. Increase monitoring frequency.
		>25% LEL	>10% LEL	Work must stop. Ventilate area before returning.
<input checked="" type="checkbox"/> Oxygen	1	Ambient Air Concentration	Confined Space Concentration	
		<19.5% O <sub>2</sub>	<19.5% O <sub>2</sub>	Leave area. Re-enter only with self-contained breathing apparatus.
		19.5% to 25% O <sub>2</sub>	19.5% to 23.5% O <sub>2</sub>	Work may continue. Investigate changes from 21%.
		>25% O <sub>2</sub>	>23.5% O <sub>2</sub>	Work must stop. Ventilate area before returning.
<input type="checkbox"/> Radiation		< 3 times background 3 times background to < 1 mR/hour          > 1 mrem/hour		Continue work. Radiation above background levels (normally 0.01-0.02 mR/hr) signifies possible radiation source(s) present. Continue investigation with caution. Perform thorough monitoring. Consult with a Health Physicist. Potential radiation hazard. Evacuate site. Continue investigation only upon the advice of Health Physicist.
<input checked="" type="checkbox"/> Organic gases and vapors	1	0 to 5 ppm – level D (unless suspected benzene then see FLD 61) 5ppm to 10 sustained in breathing zone – level C. Above 10 sustained in the breathing zone – consult H&S		Level D PPE modified for open-top storage tank sampling Level C PPE for drum sampling
<input type="checkbox"/> Inorganic gases, vapors, and particulates				

### **4.3 ACTION LEVELS**

**(Attach action level calculations)**



## **5. HOSPITAL INFORMATION**

## 5.1 CONTINGENCIES

### 5.1.1 Emergency Contacts and Phone Numbers

Agency	Contact	Phone Number
WorkCare WESTON Medical Director WorkCare WESTON Program Administrator	Dr. Peter Greaney Heather Lind Paula Sandrock	From 6 am to 4:30 pm PST call 800-455-6155 dial 0 or x475 (Heather Lind) or x110 (Paula Sandrock) to request the on-call clinician.
After-Business Hours Contact (In Case of Emergency Only)		From 4:31 pm to 5:59 am PST, all day Saturday, Sunday and Holidays call 800-455-6155 dial 3 to reach the after-hours answering service. Request that the service connect you with the on-call clinician or the on-call clinician will return your call within 30 minutes.
WESTON Corporate Environmental Health & Safety Director	Owen B. Douglass, Jr.	610-701-3065 610-506-5392 (cell)
WESTON Medical Programs Manager	Owen B. Douglass, Jr.	610-701-3065 610-506-5392 (cell)
WESTON Health & Safety Division Safety Manager	Ted Deecke	847-337-4147
WESTON Health & Safety Local Safety Officer	Tonya Balla	847-918-4094 847-528-2623
Fire Department	911	911
Police Department	911	911
WESTON FSO Cell Phone	Trenna Seilheimer Rick Mehl	260-348-4911 847-254-6981
WESTON PM Cell Phone	Rick Mehl	312-424-3312 847-254-6981
Client Site Phone	US EPA OSC Verneta Simon	312-886-3601 312-802-1404
Site Telephone	NA	NA
Nearest Telephone	NA	NA
Poison Control		800-222-1222

#### Local Medical Emergency Facility(s)

Name of Hospital: St Vincent Hospital

Address: 2001 West 86<sup>th</sup> Street, Indianapolis, IN

Phone No.: 911

Name of Contact: Emergency Room

Phone No.: 317-338-2345

#### Type of Service:

- ☐ Physical trauma only  
☐ Chemical exposure only  
☒ Physical trauma and chemical exposure  
☐ Available 24 hours

Route to Hospital:  
(See Attached)

Travel time from site:  
7 mins

Distance to hospital:  
2.8 miles

Name/no. of 24-hr  
ambulance service: 911

#### Secondary or Specialty Service Provider

Name of Hospital:

Address:

Phone No.:

Name of Contact:

Phone No.:

#### Type of Service:

- ☐ Physical trauma only  
☐ Chemical exposure only  
☐ Physical trauma and chemical exposure  
☐ Available 24 hours

Route to Hospital (see attached):

Travel time from site:

Distance to hospital:


Name/no. of 24-hr ambulance  
service:  
/

**See reporting an incident in Attachment F.**

## 5.1.2 Hospital Map

(Attach hospital map and directions)



 4910 W 86th St, Indianapolis, IN 46268

1. Head west on W 86th St toward Picnic Rd

go 381 ft  
total 381 ft



2. Make a U-turn at Picnic Rd  
About 7 mins

go 2.4 mi  
total 2.5 mi



3. Turn right at Naab Rd  
Destination will be on the left  
About 1 min

go 0.3 mi  
total 2.8 mi

 St. Vincent HEALTH  
2001 West 86th Street, Indianapolis, Indiana 46260 - (317) 338-2345

## 5.1 CONTINGENCIES

### 5.1.3 Response Plans

<b>Medical - General</b>  Provide first aid, if trained; assess and determine need for further medical assistance.  Transport or arrange for transport after appropriate decontamination.		First Aid Kit: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  Blood Borne Pathogens Kit: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<b>Type</b>  Standard 20-man and infection control kit	<b>Location</b>  In Vehicle	Special First-Aid Procedures: Cyanides on-site <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  If yes, contact LMF. Do they have antidote kit? <input type="checkbox"/> Yes <input type="checkbox"/> No
		Eyewash required <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<b>Type</b>	<b>Location</b>	<b>HF on-site</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  If yes, need neutralizing ointment for first-aid kit. Contact LMF.
		Shower required <input type="checkbox"/> Yes <input type="checkbox"/> No	<b>Type</b>	<b>Location</b>	
<b>Plan for Response to Spill/Release</b>		<b>Plan for Response to Fire/Explosion</b>			<b>Fire Extinguishers</b>
In the event of a spill or release, ensure safety, assess situation, and perform containment and control measures, as appropriate.	a. Cleanup per MSDSs if small; or sound alarm, call for assistance, notify Emergency Coordinator  b. Evacuate to pre-determined safe place  c. Account for personnel  d. Determine if team can respond safely  e. Mobilize per Site Spill Response Plan	In the event of a fire or explosion, ensure personal safety, assess situation, and perform containment and control measures, as appropriate:	a. Sound alarm and call for assistance, notify Emergency Coordinator  b. Evacuate to predetermined safe place  c. Account for personnel  d. Use fire extinguisher <u>only if safe and trained</u> in its use  e. Stand by to inform emergency responders of materials and conditions	Type/Location <u>ABC/Vehicle</u> _____ / _____ _____ / _____ _____ / _____ _____ / _____ _____ / _____ _____ / _____	
<b>Description of Spill Response Gear</b>	<b>Location</b>	<b>Description (Other Fire Response Equipment)</b>			<b>Location</b>
<b>Plan to Respond to Security Problems</b>					
Avoid Confrontation Call 911 Call WESTON PM and Safety Officer					

## **6. DECONTAMINATION PLAN**

## 6.1 GENERAL DECONTAMINATION PLAN

### Personnel Decontamination

Consistent with the levels of protection required, step-by-step procedures for personnel decontamination for each level of protection are attached.

### Levels of Protection Required for Decontamination Personnel

The levels of protection required for personnel assisting with decontamination will be:

☐

Level B

☒

Level C

☒

Level D

Modifications include:

Level D PPE modified for Open-top Storage Tank Sampling

Level C PPE for drum sampling

### Disposition of Decontamination Wastes

Provide a description of waste disposition including identification of storage area, hauler, and final disposal site, if applicable

The performance of field activities will produce waste products, such as spent sampling supplies (e.g., drum thieves, bailers, spoons), and expendable PPE. Decontamination water may be generated. All disposable waste generated during the site assessment will be placed in trash bags and disposed of as general refuse.

### Equipment Decontamination

A procedure for decontamination steps required for non-sampling equipment and heavy machinery follows:

### Sampling Equipment Decontamination

Sampling equipment will be decontaminated in accordance with the following procedure:

All disposable sampling supplies and PPE will be bagged and disposed of as general refuse.

## 6.2 LEVEL D DECONTAMINATION PLAN

Check indicated functions or add steps, as necessary:

Function	Description of Process, Solution, and Container
<input type="checkbox"/> Segregated equipment drop	
<input type="checkbox"/> Boot cover and glove wash	
<input type="checkbox"/> Boot cover and glove rinse	
<input checked="" type="checkbox"/> Tape removal - outer glove and boot	Dry Decon
<input checked="" type="checkbox"/> Boot cover removal	Dry Decon
<input checked="" type="checkbox"/> Outer glove removal	Dry Decon
<b>HOTLINE</b>	
<input type="checkbox"/> Suit/safety boot wash	
<input type="checkbox"/> Suit/boot/glove rinse	
<input type="checkbox"/> Safety boot removal	
<input checked="" type="checkbox"/> Suit removal	Dry Decon
<input type="checkbox"/> Inner glove wash	
<input type="checkbox"/> Inner glove rinse	
<input checked="" type="checkbox"/> Inner glove removal	Dry Decon
<input type="checkbox"/> Inner clothing removal	
<b>CONTAMINATION REDUCTION ZONE (CRZ)/SAFE ZONE BOUNDARY</b>	
<input type="checkbox"/> Field wash	
<input type="checkbox"/> Redress	
<b>Disposal Plan, End of Day:</b> All PPE will be bagged and disposed of as general refuse.	
<b>Disposal Plan, End of Week:</b>	
<b>Disposal Plan, End of Project:</b>	

### 6.3 LEVEL C DECONTAMINATION PLAN

Check indicated functions or add steps, as necessary:

Function	Description of Process, Solution, and Container
----------	---

<input type="checkbox"/> Segregated equipment drop	
--	--

<input type="checkbox"/> Boot cover and glove wash	
--	--

<input type="checkbox"/> Boot cover and glove rinse	
---	--

<input checked="" type="checkbox"/> Tape removal - outer glove and boot	Dry Decon
---	-----------

<input checked="" type="checkbox"/> Boot cover removal	Dry Decon
--	-----------

<input checked="" type="checkbox"/> Outer glove removal	Dry Decon
---	-----------

#### HOTLINE

<input type="checkbox"/> Suit/safety boot wash	
--	--

<input type="checkbox"/> Suit/boot/glove rinse	
--	--

<input type="checkbox"/> Safety boot removal	
--	--

<input checked="" type="checkbox"/> Suit removal	Dry Decon
--	-----------

<input type="checkbox"/> Inner glove wash	
---	--

<input type="checkbox"/> Inner glove rinse	
--	--

<input checked="" type="checkbox"/> Facepiece removal	Dry Decon
---	-----------

<input checked="" type="checkbox"/> Inner glove removal	Dry Decon
---	-----------

<input type="checkbox"/> Inner clothing removal	
---	--

#### CONTAMINATION REDUCTION ZONE (CRZ)/SAFE ZONE BOUNDARY

<input type="checkbox"/> Field wash	
-------------------------------------	--

<input type="checkbox"/> Redress	
----------------------------------	--

#### Disposal Plan, End of Day:

All PPE will be bagged and disposed of as general refuse.

#### Disposal Plan, End of Week:

#### Disposal Plan, End of Project:



## **7. TRAINING AND BRIEFING TOPICS/SIGN OFF SHEET**

## 7.1 TRAINING AND BRIEFING TOPICS

The following items will be covered at the site-specific training meeting, daily or periodically.

<input type="checkbox"/> Site characterization and analysis, Sec. 3.0, 29 CFR 1910.120 (l)	<input type="checkbox"/> Level A
<input checked="" type="checkbox"/> Physical hazards, HASP Form 07	<input type="checkbox"/> Level B
<input checked="" type="checkbox"/> Chemical hazards, HASP Form 04	<input checked="" type="checkbox"/> Level C
<input checked="" type="checkbox"/> Animal bites, stings, and poisonous plants	<input checked="" type="checkbox"/> Level D
<input type="checkbox"/> Etiologic (infectious) agents	<input type="checkbox"/> Monitoring, 29 CFR 1910.120 (h)
<input type="checkbox"/> Site control, 29 CFR 1910.120 (d)	<input checked="" type="checkbox"/> Decontamination, 29 CFR 1910.120 (k)
<input checked="" type="checkbox"/> Engineering controls and work practices, 29 CFR 1910.120 (g)	<input type="checkbox"/> Emergency response, 29 CFR 1910.120 (l)
<input type="checkbox"/> Heavy machinery	<input type="checkbox"/> Elements of an emergency response, 29 CFR 1910.120 (l)
<input type="checkbox"/> Forklift	<input type="checkbox"/> Procedures for handling site emergency incidents, 29 CFR 1910.120 (l)
<input type="checkbox"/> Backhoe	<input type="checkbox"/> Off-site emergency response, 29 CFR 1910.120 (l)
<input checked="" type="checkbox"/> Equipment	<input checked="" type="checkbox"/> Handling drums and containers, 29 CFR 1910.120 (j)
<input type="checkbox"/> Tools	<input checked="" type="checkbox"/> Opening drums and containers
<input checked="" type="checkbox"/> Ladder, 29 CFR 1910.27 (d)/29 CFR 1926	<input type="checkbox"/> Electrical material handling equipment
<input type="checkbox"/> Overhead and underground utilities	<input type="checkbox"/> Radioactive waste
<input type="checkbox"/> Scaffolds	<input type="checkbox"/> Shock-sensitive waste
<input checked="" type="checkbox"/> Structural integrity	<input type="checkbox"/> Laboratory waste packs
<input type="checkbox"/> Unguarded openings - wall, floor, ceilings	<input checked="" type="checkbox"/> Sampling drums and containers
<input type="checkbox"/> Pressurized air cylinders	<input type="checkbox"/> Shipping and transport, 49 CFR 172.101, IATA
<input checked="" type="checkbox"/> Personal protective equipment, 29 CFR 1910.120 (g); 29 CFR 1910.134	<input type="checkbox"/> Tank and vault procedures
<input checked="" type="checkbox"/> Respiratory protection, 29 CFR 1910.120 (g); ANSI Z88.2	<input checked="" type="checkbox"/> Illumination, 29 CFR 1910.120 (m)
<input type="checkbox"/> Working over water FLD-19	<input type="checkbox"/> Sanitation, 29 CFR 1910.120 (n)
<input type="checkbox"/> Boating safety FLD-18	<input type="checkbox"/>
<input checked="" type="checkbox"/> Heat /Cold Stress	<input type="checkbox"/>
<input type="checkbox"/> Proper lifting techniques	<input type="checkbox"/>

## 7.2 HEALTH AND SAFETY PLAN APPROVAL/SIGNOFF FORM

**Site Name:** ESI Environmental, Inc.

WO#: 20405.012.001.1184.00

**Address:** 4910 W 86<sup>th</sup> Street, Indianapolis, IN

I understand, agree to, and will conform with the information set forth in this Health and Safety Plan (and attachments) and discussed in the personnel health and safety briefing(s).

Name

**Signature**

**Date**[illegible]

---

**ATTACHMENT A**  
**CHEMICAL CONTAMINANTS DATA SHEETS**

---

Insert sheets on following page.



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NIOSH Publication Number 2005-149

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Enter search terms separated by spaces.

# Hydrogen peroxide

**Synonyms & Trade Names** High-strength hydrogen peroxide, Hydrogen dioxide, Hydrogen peroxide (aqueous), Hydroperoxide, Peroxide

**CAS No.**  
7722-84-1

**RTECS No.** [MX0900000](http://niosh-rtecs/MXDBBA0.html)  
(/niosh-rtecs/MXDBBA0.html)

**DOT ID & Guide** 2984 [140](http://www.wapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=140) [Ⓜ  
\(<http://www.wapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=140>\) \(8-20% solution\)  
2014 \[140\]\(http://www.wapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=140\) \[Ⓜ \\(<http://www.wapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=140>\\) \\(20-60% solution\\)  
2015 \\[143\\]\\(http://www.wapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=143\\) \\[Ⓜ \\\(<http://www.wapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=143>\\\) \\\(>60% solution\\\)\\]\\(http://www.wapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=143\\)\]\(http://www.wapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=140\)](http://www.wapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=140)

**Formula** H<sub>2</sub>O<sub>2</sub>

**Conversion** 1 ppm = 1.39 mg/m<sup>3</sup>

**IDLH** 75 ppm  
See: [772841](http://niosh/idlh/772841.html) (/niosh/idlh/772841.html)

### Exposure Limits

**NIOSH REL** : TWA 1 ppm (1.4 mg/m<sup>3</sup>)  
**OSHA PEL** : TWA 1 ppm (1.4 mg/m<sup>3</sup>)

**Measurement Methods**  
**OSHA ID126SG** [Ⓜ \(<http://www.osha.gov/dts/sltc/methods/partial/t-id126sg-pv-01-0201-m/t-id126sg-pv-01-0201-m.html>\)  
See: \[NMAM\]\(http://niosh/docs/2003-154/\) \(/niosh/docs/2003-154/\) or \*\*OSHA Methods\*\* \[Ⓜ\]\(http://www.osha.gov/dts/sltc/methods/index.html\) \(<http://www.osha.gov/dts/sltc/methods/index.html>\)](http://www.osha.gov/dts/sltc/methods/partial/t-id126sg-pv-01-0201-m/t-id126sg-pv-01-0201-m.html)

**Physical Description** Colorless liquid with a slightly sharp odor. [Note: The pure compound is a crystalline solid below 12°F. Often used in an aqueous solution.]

**MW:**  
34.0

**BP:**  
286°F

**FRZ:** 12°F

**Sol:** Miscible

**VP(86°F):** 5 mmHg

**IP:** 10.54 eV

**Sp.Gr:**  
1.39

**Fl.P:**  
NA

**UEL:** NA

**LEL:** NA

Noncombustible Liquid, but a powerful oxidizer.

**Incompatibilities & Reactivities** Oxidizable materials, iron, copper, brass, bronze, chromium, zinc, lead, silver, manganese. [Note: Contact with combustible material may result in SPONTANEOUS combustion.]

**Exposure Routes** inhalation, ingestion, skin and/or eye contact

**Symptoms** irritation eyes, nose, throat; corneal ulcer; erythema (skin redness), vesiculation skin; bleaching hair

**Target Organs** Eyes, skin, respiratory system

**Personal Protection/Sanitation** (See protection codes ([protect.html](#)) )

**Skin:** Prevent skin contact

**Eyes:** Prevent eye contact

**Wash skin:** When contaminated

**Remove:** When wet or contaminated

**Change:** No recommendation

**Provide:** Eyewash, Quick drench

**First Aid** (See procedures ([firstaid.html](#)) )

**Eye:** Irrigate immediately

**Skin:** Water flush immediately

**Breathing:** Respiratory support

**Swallow:** Medical attention immediately

#### Respirator Recommendations

#### NIOSH/OSHA

##### Up to 10 ppm:

(APF = 10) Any supplied-air respirator\*

##### Up to 25 ppm:

(APF = 25) Any supplied-air respirator operated in a continuous-flow mode\*

##### Up to 50 ppm:

(APF = 50) Any self-contained breathing apparatus with a full facepiece

(APF = 50) Any supplied-air respirator with a full facepiece

##### Up to 75 ppm:

(APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

##### Emergency or planned entry into unknown concentrations or IDLH conditions:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

##### Escape:

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern

Any appropriate escape-type, self-contained breathing apparatus

Important additional information about respirator selection ([pgintrod.html#mustread](#))

See also: [INTRODUCTION \(/niosh/npg/pgintrod.html\)](/niosh/npg/pgintrod.html)

Page last reviewed: February 3, 2009

Page last updated: February 3, 2009

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Enter search terms separated by spaces.

### Iron salts (soluble, as Fe)

**Synonyms & Trade Names** **FeSO<sub>4</sub>**: Ferrous sulfate, Iron(II) sulfate; **FeCl<sub>2</sub>**: Ferrous chloride, Iron(II) chloride; **Fe(NO<sub>3</sub>)<sub>3</sub>**: Ferric nitrate, Iron(III) nitrate; **Fe(SO<sub>4</sub>)<sub>3</sub>**: Ferric sulfate, Iron(III) sulfate; **FeCl<sub>3</sub>**: Ferric chloride, Iron (III) chloride

**CAS No.**

**RTECS No.**

**DOT ID & Guide**

**Conversion**

**IDLH** N.D.

See: [IDLH INDEX \(/niosh/idlh/intridl4.html\)](/niosh/idlh/intridl4.html)



#### Exposure Limits


**NIOSH REL** : TWA 1 mg/m<sup>3</sup>



**OSHA PEL** †: none

#### Measurement Methods

**NIOSH 7300**  (</niosh/docs/2003-154/pdfs/7300.pdf>) ,

**7301**  (</niosh/docs/2003-154/pdfs/7301.pdf>) , **7303**  (</niosh/docs/2003-154/pdfs/7303.pdf>) ,

**9102**  (</niosh/docs/2003-154/pdfs/9102.pdf>) ;

**OSHA ID121**  (<http://www.osha.gov/dts/sltc/methods/inorganic/id121/id121.html>) , **ID125G**  (<http://www.osha.gov/dts/sltc/methods/inorganic/id125g/id125g.html>)

See: [NMAM \(/niosh/docs/2003-154/\)](/niosh/docs/2003-154/) or [OSHA Methods \(http://www.osha.gov/dts/sltc/methods/index.html\)](http://www.osha.gov/dts/sltc/methods/index.html)

**Physical Description** Appearance and odor vary depending upon the specific soluble iron salt.

Properties vary depending upon the specific soluble iron salt.

Noncombustible Solids

**Incompatibilities & Reactivities** Varies

**Exposure Routes** inhalation, ingestion, skin and/or eye contact



**Symptoms** irritation eyes, skin, mucous membrane; abdominal pain, diarrhea, vomiting; possible liver damage

**Target Organs** Eyes, skin, respiratory system, liver, gastrointestinal tract

**Personal Protection/Sanitation** (See [protection codes \(protect.html\)](#) )

**Skin:** Prevent skin contact

**Eyes:** Prevent eye contact

**Wash skin:** Daily

**Remove:** No recommendation

**Change:** Daily

**First Aid** (See [procedures \(firstaid.html\)](#) )

**Eye:** Irrigate immediately

**Skin:** Soap wash

**Breathing:** Respiratory support

**Swallow:** Medical attention immediately

**Respirator Recommendations**

Not available.

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

See also: [INTRODUCTION \(/niosh/npg/pgintrod.html\)](#)

Page last reviewed: February 3, 2009

Page last updated: February 3, 2009

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# Sodium hydroxide

**Synonyms & Trade Names** Caustic soda, Lye, Soda lye, Sodium hydrate

**CAS No.** 1310-73-2

**RTECS No.** WB4900000  
(/niosh-rtecs/WB4AC4A0.html)

**DOT ID & Guide** 1823 154   
(http://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=154) (dry, solid)  
1824 154 (http://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=154)  
(solution)

**Formula** NaOH

**Conversion**

**IDLH** 10 mg/m<sup>3</sup>  
See: 1310732 (/niosh/idlh/1310732.html)

### Exposure Limits

**NIOSH REL** : C 2 mg/m<sup>3</sup>  
**OSHA PEL** †: TWA 2 mg/m<sup>3</sup>

### Measurement Methods

**NIOSH 7401** (/niosh/docs/2003-154/pdfs/7401.pdf)  
See: **NMAM** (/niosh/docs/2003-154/) or **OSHA Methods** (http://www.osha.gov/dts/sltc/methods/index.html)

**Physical Description** Colorless to white, odorless solid (flakes, beads, granular form).

**MW:**  
40.0

**BP:**  
2534°F

**MLT:** 605°F

**Sol:** 111%

**VP:** 0 mmHg (approx)

**IP:** NA

**Sp.Gr:**  
2.13

**FLP:** NA

**UEL:** NA

**LEL:** NA

Noncombustible Solid, but when in contact with water may generate sufficient heat to ignite combustible materials.

**Incompatibilities & Reactivities** Water; acids; flammable liquids; organic halogens; metals such as aluminum, tin & zinc; nitromethane [Note: Corrosive to metals.]

**Exposure Routes** inhalation, ingestion, skin and/or eye contact

**Symptoms** irritation eyes, skin, mucous membrane; pneumonitis; eye, skin burns; temporary loss of hair

**Target Organs** Eyes, skin, respiratory system

**Personal Protection/Sanitation** (See [protection codes](#) ([protect.html](#)))

**Skin:** Prevent skin contact

**Eyes:** Prevent eye contact

**Wash skin:** When contaminated

**Remove:** When wet or contaminated

**Change:** Daily

**Provide:** Eyewash, Quick drench

**First Aid** (See [procedures](#) ([firstaid.html](#)))

**Eye:** Irrigate immediately

**Skin:** Water flush immediately

**Breathing:** Respiratory support

**Swallow:** Medical attention immediately

#### Respirator Recommendations

#### NIOSH/OSHA

##### Up to 10 mg/m<sup>3</sup>:

(APF = 25) Any supplied-air respirator operated in a continuous-flow mode<sup>£</sup>

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter.

Click here ([pgintrod.html#nrp](#)) for information on selection of N, R, or P filters.

(APF = 25) Any powered, air-purifying respirator with a high-efficiency particulate filter.<sup>£</sup>

(APF = 50) Any self-contained breathing apparatus with a full facepiece

(APF = 50) Any supplied-air respirator with a full facepiece

##### Emergency or planned entry into unknown concentrations or IDLH conditions:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

##### Escape:

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter.

Click here ([pgintrod.html#nrp](#)) for information on selection of N, R, or P filters.

Any appropriate escape-type, self-contained breathing apparatus

Important additional information about respirator selection ([pgintrod.html#mustread](#))

See also: [INTRODUCTION \(/niosh/npg/pgintrod.html\)](#) See ICSC CARD: [0360 \(/niosh/ipcsneng/neng0360.html\)](#) See MEDICAL TESTS: [0210 \(/niosh/docs/2005-110/nmed0210.html\)](#)

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### Sulfuric acid

**Synonyms & Trade Names** Battery acid, Hydrogen sulfate, Oil of vitriol, Sulfuric acid (aqueous)

**CAS No.** 7664-93-9

**RTECS No.** WS5600000  
([/niosh-rtecs/WS557300.html](http://niosh-rtecs/WS557300.html))

**DOT ID & Guide** 1830 137 (<http://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=137>)  
1831 137 (<http://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=137>) (fuming)  
1832 137 (<http://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=137>) (spent)

**Formula** H<sub>2</sub>SO<sub>4</sub>

**Conversion**

**IDLH** 15 mg/m<sup>3</sup>  
See: 7664939 ([/niosh/idlh/7664939.html](http://niosh/idlh/7664939.html))

#### Exposure Limits

**NIOSH REL** : TWA 1 mg/m<sup>3</sup>

**OSHA PEL** : TWA 1 mg/m<sup>3</sup>

#### Measurement Methods

**NIOSH** 7903 ([/niosh/docs/2003-154/pdfs/7903.pdf](http://niosh/docs/2003-154/pdfs/7903.pdf)) ;

**OSHA** ID113 (<http://www.osha.gov/dts/sltc/methods/inorganic/id113/id113.html>) , ID165SG (<http://www.osha.gov/dts/sltc/methods/inorganic/id165sg/id165sg.html>)

See: **NMAM** ([/niosh/docs/2003-154/](http://niosh/docs/2003-154/)) or **OSHA Methods** (<http://www.osha.gov/dts/sltc/methods/index.html>)

**Physical Description** Colorless to dark-brown, oily, odorless liquid. [Note: Pure compound is a solid below 51°F. Often used in an aqueous solution.]

**MW:** 98.1

**BP:**  
554°F

**FRZ:** 51°F

**Sol:** Miscible

**VP:** 0.001 mmHg

**IP:** ?

<b>Sp.Gr:</b> 1.84 (96-98% acid)	<b>Fl.P:</b> NA	<b>UEL:</b> NA	<b>LEL:</b> NA		
Noncombustible Liquid, but capable of igniting finely divided combustible materials.					
<b>Incompatibilities &amp; Reactivities</b> Organic materials, chlorates, carbides, fulminates, water, powdered metals [Note: Reacts violently with water with evolution of heat. Corrosive to metals.]					
<b>Exposure Routes</b> inhalation, ingestion, skin and/or eye contact					
<b>Symptoms</b> irritation eyes, skin, nose, throat; pulmonary edema, bronchitis; emphysema; conjunctivitis; stomatis; dental erosion; eye, skin burns; dermatitis					
<b>Target Organs</b> Eyes, skin, respiratory system, teeth					
<b>Personal Protection/Sanitation</b> (See protection codes (protect.html) ) <b>Skin:</b> Prevent skin contact <b>Eyes:</b> Prevent eye contact <b>Wash skin:</b> When contaminated <b>Remove:</b> When wet or contaminated <b>Change:</b> No recommendation <b>Provide:</b> Eyewash (>1%), Quick drench (>1%)			<b>First Aid</b> (See procedures (firstaid.html) ) <b>Eye:</b> Irrigate immediately <b>Skin:</b> Water flush immediately <b>Breathing:</b> Respiratory support <b>Swallow:</b> Medical attention immediately		
<b>Respirator Recommendations</b> <b>NIOSH/OSHA</b>  <b>Up to 15 mg/m<sup>3</sup>:</b> (APF = 25) Any supplied-air respirator operated in a continuous-flow mode <sup>£</sup> (APF = 25) Any powered, air-purifying respirator with acid gas cartridge(s) in combination with a high-efficiency particulate filter <sup>£</sup> (APF = 50) Any chemical cartridge respirator with a full facepiece and acid gas cartridge(s) in combination with an N100, R100, or P100 filter. <a href="#">Click here (pgintrod.html#nrp)</a> for information on selection of N, R, or P filters. (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted acid gas canister having an N100, R100, or P100 filter. <a href="#">Click here (pgintrod.html#nrp)</a> for information on selection of N, R, or P filters. (APF = 50) Any self-contained breathing apparatus with a full facepiece (APF = 50) Any supplied-air respirator with a full facepiece  <b>Emergency or planned entry into unknown concentrations or IDLH conditions:</b> (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode (APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus  <b>Escape:</b> (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted acid gas canister having an N100, R100, or P100 filter.					

**[Click here \(pgintrod.html#nrp\)](#)** for information on selection of N, R, or P filters.

**Any appropriate escape-type, self-contained breathing apparatus**

**[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)**

**See also: [INTRODUCTION \(/niosh/npg/pgintrod.html\)](#) See ICSC CARD: [0362 \(/niosh/ipcsneng/neng0362.html\)](#) See MEDICAL TESTS: [0218 \(/niosh/docs/2005-110/nmed0218.html\)](#)**

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Page last reviewed: February 3, 2009

Page last updated: February 3, 2009

Content source: [National Institute for Occupational Safety and Health \(NIOSH\)](#) Education and Information Division

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Centers for Disease Control and Prevention 1600 Clifton Rd. Atlanta, GA 30333, USA  
800-CDC-INFO (800-232-4636) TTY: (888) 232-6348, 24 Hours/Every Day -  
[cdcinfo@cdc.gov](mailto:cdcinfo@cdc.gov)





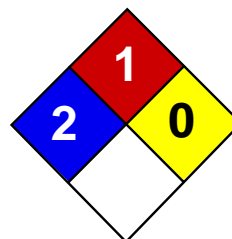
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**ATTACHMENT B**  
**MATERIAL SAFETY DATA SHEETS**  
**(ATTACH MSDSS)**

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Insert documents on following page.





Health	2
Fire	1
Reactivity	0
Personal Protection	E

## Material Safety Data Sheet

### Citric acid MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** Citric acid

**Catalog Codes:** SLC5449, SLC2665, SLC4453, SLC1660, SLC3451

**CAS#:** 77-92-9

**RTECS:** GE7350000

**TSCA:** TSCA 8(b) inventory: Citric acid

**CI#:** Not available.

**Synonym:** 2-Hydroxy-1,2,3-propanetricarboxylic acid

**Chemical Name:** Citric Acid

**Chemical Formula:** C<sub>6</sub>H<sub>8</sub>O<sub>7</sub>

#### Contact Information:

**Sciencelab.com, Inc.**

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: [ScienceLab.com](http://ScienceLab.com)

**CHEMTREC (24HR Emergency Telephone), call:**

1-800-424-9300

**International CHEMTREC, call:** 1-703-527-3887

**For non-emergency assistance, call:** 1-281-441-4400

#### Section 2: Composition and Information on Ingredients

##### Composition:

Name	CAS #	% by Weight
Citric acid	77-92-9	100

**Toxicological Data on Ingredients:** Citric acid: ORAL (LD50): Acute: 5040 mg/kg [Mouse]. 3000 mg/kg [Rat].

#### Section 3: Hazards Identification

##### Potential Acute Health Effects:

Hazardous in case of eye contact (irritant), of inhalation (lung irritant). Slightly hazardous in case of skin contact (irritant, sensitizer), of ingestion. The amount of tissue damage depends on length of contact. Eye contact can result in corneal damage or blindness. Skin contact can produce inflammation and blistering. Severe over-exposure can produce lung damage, choking, unconsciousness or death.

##### Potential Chronic Health Effects:

Slightly hazardous in case of skin contact (sensitizer). CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to teeth. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure of the eyes to a low level of dust can produce eye irritation. Repeated skin exposure can produce local skin destruction, or dermatitis. Repeated inhalation of dust can produce varying degree of respiratory irritation or lung damage.

#### Section 4: First Aid Measures

**Eye Contact:**

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention.

**Skin Contact:**

In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

**Serious Skin Contact:**

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

**Inhalation:**

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

**Serious Inhalation:** Not available.

**Ingestion:**

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

**Serious Ingestion:** Not available.

## Section 5: Fire and Explosion Data

**Flammability of the Product:** May be combustible at high temperature.

**Auto-Ignition Temperature:** 1010°C (1850°F)

**Flash Points:** Not available.

**Flammable Limits:** LOWER: 0.28 Kg/M3 (Dust) UPPER: 2.29 Kg/M3 (Dust)

**Products of Combustion:** These products are carbon oxides (CO, CO2).

**Fire Hazards in Presence of Various Substances:**

Slightly flammable to flammable in presence of heat. Non-flammable in presence of shocks.

**Explosion Hazards in Presence of Various Substances:**

Slightly explosive in presence of open flames and sparks. Non-explosive in presence of shocks.

**Fire Fighting Media and Instructions:**

SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

**Special Remarks on Fire Hazards:** As with most organic solids, fire is possible at elevated temperatures

**Special Remarks on Explosion Hazards:**

Fine dust dispersed in air in sufficient concentrations, and in the presences of an ignition source is a potential dust explosion hazard.

## Section 6: Accidental Release Measures

**Small Spill:**

Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

**Large Spill:**

Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

## Section 7: Handling and Storage

### Precautions:

Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe dust. Avoid contact with eyes. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, reducing agents, metals, alkalis.

**Storage:** Keep container tightly closed. Keep container in a cool, well-ventilated area.

## Section 8: Exposure Controls/Personal Protection

### Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

### Personal Protection:

Safety glasses. Lab coat. Gloves (impervious). Dust respirator. Be sure to use an approved/certified respirator or equivalent. The dust respirator should be used for conditions where exposure has exceeded recommended exposure limits, dust is apparent, and engineering controls (adequate ventilation) are not feasible.

### Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

### Exposure Limits:

No exposure guidelines have been established. ACGIH, NIOSH and OSHA have not developed exposure limits for this product. The exposure limits given below are for particulates not otherwise classified: ACGIH: 10 mg/m<sup>3</sup> TWA (Total Inhalable fraction); 3 mg/m<sup>3</sup> TWA (Respirable fraction) OSHA: 15 mg/m<sup>3</sup> TWA (Total dust); 5 mg/m<sup>3</sup> TWA (Respirable Fraction)

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Solid. (Crystalline powder)

**Odor:** Odorless.

**Taste:** Acid. (Strong.)

**Molecular Weight:** 192.13 g/mole

**Color:** Not available.

**pH (1% soln/water):** Not available.

**Boiling Point:** Decomposes.

**Melting Point:** 153°C (307.4°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 1.665 (Water = 1)

**Vapor Pressure:** Not applicable.

**Vapor Density:** Not available.

**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** The product is more soluble in water; log(oil/water) = -1.7

**Ionicity (in Water):** Not available.

**Dispersion Properties:** See solubility in water, diethyl ether.

**Solubility:**

Soluble in cold water, hot water, diethyl ether. Insoluble in benzene.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Excess heat, incompatible materials

**Incompatibility with various substances:** Reactive with oxidizing agents, reducing agents, metals, alkalis.

**Corrosivity:**

Corrosive in presence of aluminum, of zinc, of copper. Non-corrosive in presence of glass.

**Special Remarks on Reactivity:**

Incompatible with oxidizing agents, potassium tartrate, alkali, alkaline earth carbonates and bicarbonates, acetates, and sulfides, metal nitrates

**Special Remarks on Corrosivity:** Will corrode copper, zinc, aluminum and their alloys.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

**Routes of Entry:** Inhalation. Ingestion.

**Toxicity to Animals:** Acute oral toxicity (LD50): 3000 mg/kg [Rat].

**Chronic Effects on Humans:** May cause damage to the following organs: teeth.

**Other Toxic Effects on Humans:**

Hazardous in case of inhalation (lung irritant). Slightly hazardous in case of skin contact (irritant, sensitizer), of ingestion.

**Special Remarks on Toxicity to Animals:** LDL[Rabbit] - Route: oral; Dose: 7000mg/kg

**Special Remarks on Chronic Effects on Humans:** Not available.

**Special Remarks on other Toxic Effects on Humans:**

Acute Potential Health Effects: Skin: Causes mild to moderate skin irritation. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material. Eyes: Causes moderate to severe eye irritation and possible injury. Ingestion: May cause gastrointestinal (digestive) tract irritation with nausea, vomiting, diarrhea. Excessive intake may cause erosion of teeth and hypocalcemia (calcium deficiency in blood). May affect behavior/central nervous system (tremor, convulsions, muscle contraction or spasticity). Inhalation: Causes moderate respiratory tract and mucous membrane irritation. Chronic Potential Health Effects: Frequent intake of citrated beverages may cause erosion of dental enamel and irritation of mucous membranes.

## Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The product itself and its products of degradation are not toxic.

**Special Remarks on the Products of Biodegradation:** Not available.

### Section 13: Disposal Considerations

**Waste Disposal:**

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

### Section 14: Transport Information

**DOT Classification:** Not a DOT controlled material (United States).

**Identification:** Not applicable.

**Special Provisions for Transport:** Not applicable.

### Section 15: Other Regulatory Information

**Federal and State Regulations:** TSCA 8(b) inventory: Citric acid

**Other Regulations:** EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

**Other Classifications:**

**WHMIS (Canada):** CLASS E: Corrosive solid.

**DSCL (EEC):**

R36/37/38- Irritating to eyes, respiratory system and skin. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S37/39- Wear suitable gloves and eye/face protection.

**HMIS (U.S.A.):**

**Health Hazard:** 2

**Fire Hazard:** 1

**Reactivity:** 0

**Personal Protection:** e

**National Fire Protection Association (U.S.A.):**

**Health:** 2

**Flammability:** 1

**Reactivity:** 0

**Specific hazard:**

**Protective Equipment:**

Gloves (impervious). Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

### Section 16: Other Information

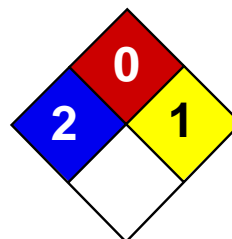
**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/09/2005 04:56 PM

**Last Updated:** 11/06/2008 12:00 PM

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Health	3
Fire	0
Reactivity	1
Personal Protection	

## Material Safety Data Sheet

### Hydrogen Peroxide, 50% MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** Hydrogen Peroxide, 50%

**Catalog Codes:** SLH1453

**CAS#:** Mixture.

**RTECS:** Not applicable.

**TSCA:** TSCA 8(b) inventory: Water; Hydrogen Peroxide

**CI#:** Not applicable.

**Synonym:** Hydrogen Peroxide, 50% Solution

**Chemical Name:** Not applicable.

**Chemical Formula:** Not applicable.

#### Contact Information:

**Sciencelab.com, Inc.**

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: [ScienceLab.com](http://ScienceLab.com)

**CHEMTREC (24HR Emergency Telephone), call:**

1-800-424-9300

**International CHEMTREC, call:** 1-703-527-3887

**For non-emergency assistance, call:** 1-281-441-4400

#### Section 2: Composition and Information on Ingredients

##### Composition:

Name	CAS #	% by Weight
Water	7732-18-5	50
Hydrogen Peroxide	7722-84-1	50

**Toxicological Data on Ingredients:** Hydrogen Peroxide: ORAL (LD50): Acute: 2000 mg/kg [Mouse]. DERMAL (LD50): Acute: 4060 mg/kg [Rat]. 2000 mg/kg [pig]. VAPOR (LC50): Acute: 2000 mg/m 4 hours [Rat].

#### Section 3: Hazards Identification

##### Potential Acute Health Effects:

Very hazardous in case of skin contact (irritant), of eye contact (irritant). Hazardous in case of skin contact (corrosive, permeator), of eye contact (corrosive), of ingestion, . Slightly hazardous in case of inhalation (lung sensitizer). Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Prolonged exposure may result in skin burns and ulcerations. Over-exposure by inhalation may cause respiratory irritation. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

##### Potential Chronic Health Effects:

**CARCINOGENIC EFFECTS:** Classified A3 (Proven for animal.) by ACGIH [Hydrogen Peroxide]. Classified 3 (Not classifiable for human.) by IARC [Hydrogen Peroxide]. **MUTAGENIC EFFECTS:** Mutagenic for mammalian somatic cells.

[Hydrogen Peroxide]. Mutagenic for bacteria and/or yeast. [Hydrogen Peroxide]. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, upper respiratory tract, skin, eyes, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection.

#### Section 4: First Aid Measures

**Eye Contact:**

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

**Skin Contact:**

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

**Serious Skin Contact:**

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

**Inhalation:**

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

**Serious Inhalation:**

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

**Ingestion:**

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

**Serious Ingestion:** Not available.

#### Section 5: Fire and Explosion Data

**Flammability of the Product:** Non-flammable.

**Auto-Ignition Temperature:** Not applicable.

**Flash Points:** Not applicable.

**Flammable Limits:** Not applicable.

**Products of Combustion:** Not available.

**Fire Hazards in Presence of Various Substances:** of combustible materials

**Explosion Hazards in Presence of Various Substances:** Explosive in presence of open flames and sparks, of heat, of organic materials, of metals, of acids.

**Fire Fighting Media and Instructions:**

Fire: Small fires: Use water. Do not use dry chemicals or foams. CO<sub>2</sub>, or Halon may provide limited control. Large fires: Flood fire area with water from a distance. Move containers from fire area if you can do it without risk. Do not move cargo or vehicle if cargo has been exposed to heat. Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Cool containers with flooding quantities of water until well after fire is out. ALWAYS stay away from tanks engulfed in fire. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. / Hydrogen peroxide, aqueous solution, with not less than 8% but less than 20% Hydrogen peroxide; Hydrogen peroxide,



aqueous solution, with not less than 20% but not more than 60% Hydrogen peroxide (stabilized as necessary)/ [QC Reviewed] [U.S. Department of Transportation. 2000 Emergency Response Guidebook. RSPA P 5800.8 Edition. Washington, D.C: U.S. Government Printing Office, 2000,p. G-140]

**Special Remarks on Fire Hazards:**

Most cellulose (wood, cotton) materials contain enough catalyst to cause spontaneous ignition with 90% Hydrogen Peroxide. Hydrogen Peroxide is a strong oxidizer. It is not flammable itself, but it can cause spontaneous combustion of flammable materials and continued support of the combustion because it liberates oxygen as it decomposes. Hydrogen peroxide mixed with magnesium and a trace of magnesium dioxide will ignite immediately.

**Special Remarks on Explosion Hazards:**

Soluble fuels (acetone, ethanol, glycerol) will detonate on a mixture with peroxide over 30% concentration, the violence increasing with concentration. Explosive with acetic acid, acetic anhydride, acetone, alcohols, carboxylic acids, nitrogen containing bases, As<sub>2</sub>S<sub>3</sub>, Cl<sub>2</sub> + KOH, FeS, FeSO<sub>4</sub> + 2 methylpyridine + H<sub>2</sub>SO<sub>4</sub>, nitric acid, potassium permanganate, P<sub>2</sub>O<sub>5</sub>, H<sub>2</sub>Se, Alcohols + H<sub>2</sub>SO<sub>4</sub>, Alcohols + tin chloride, Antimony trisulfide, chlorosulfonic acid, Aromatic hydrocarbons + trifluoroacetic acid, Azelaic acid + sulfuric acid (above 45 C), Benzenesulfonic anhydride, tert-butanol + sulfuric acid, Hydrazine, Sulfuric acid, Sodium iodate, Tetrahydrothiophene, Thiodiglycol, Mercurous oxide, mercuric oxide, Lead dioxide, Lead oxide, Manganese dioxide, Lead sulfide, Gallium + HCl, Ketenes + nitric acid, Iron (II) sulfate + 2-methylpyridine + sulfuric acid, Iron (II) sulfate + nitric acid, + sodium carboxymethylcellulose (when evaporated), Vinyl acetate, trioxane, water + oxygenated compounds (eg: acetaldehyde, acetic acid, acetone, ethanol, formaldehyde, formic acid, methanol, 2-propanol, propionaldehyde), organic compounds. Beware: Many mixtures of hydrogen peroxide and organic materials may not explode upon contact. However, the resulting combination is detonatable either upon catching fire or by impact. EXPLOSION HAZARD: SEVERE, WHEN HIGHLY CONCENTRATED OR PURE H<sub>2</sub>O<sub>2</sub> IS EXPOSED TO HEAT, MECHANICAL IMPACT, OR CAUSED TO DECOMPOSE CATALYTICALLY BY METALS & THEIR SALTS, DUSTS & ALKALIES. ANOTHER SOURCE OF HYDROGEN PEROXIDE EXPLOSIONS IS FROM SEALING THE MATERIAL IN STRONG CONTAINERS. UNDER SUCH CONDITIONS EVEN GRADUAL DECOMPOSITION OF HYDROGEN PEROXIDE TO WATER + 1/2 OXYGEN CAN CAUSE LARGE PRESSURES TO BUILD UP IN THE CONTAINERS WHICH MAY BURST EXPLOSIVELY. Fire or explosion: May explode from friction, heat or contamination. These substances will accelerate burning when involved in a fire. May ignite combustibles (wood, paper, oil, clothing, etc.). Some will react explosively with hydrocarbons (fuels). Containers may explode when heated. Runoff may create fire or explosion hazard. /Hydrogen peroxide, aqueous solution, stabilized, with more than 60% Hydrogen peroxide; Hydrogen peroxide, stabilized/ [QC Reviewed] [U.S. Department of Transportation. 2000 Emergency Response Guidebook. RSPA P 5800.8 Edition. Washington, D.C: U.S. Government Printing Office, 2000,p. G-143] . Fire or explosion: These substances will accelerate burning when involved in a fire. Some may decompose explosively when heated or involved in a fire. May explode from heat or contamination. Some will react explosively with hydrocarbons (fuels). May ignite combustibles (wood, paper, oil, clothing, etc.). Containers may explode when heated. Runoff may create fire or explosion hazard. /Hydrogen peroxide, aqueous solution, with not less than 8% but less than 20% Hydrogen peroxide; Hydrogen peroxide, aqueous solution, with not less than 20% but not more than 60% Hydrogen peroxide (stabilized as necessary)/ [QC Reviewed] [U.S. Department of Transportation. 2000 Emergency Response Guidebook. RSPA P 5800.8 Edition. Washington, D.C: U.S. Government Printing Office, 2000,p. G-140] (Hydrogen Peroxide)

## Section 6: Accidental Release Measures

**Small Spill:**

Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.

**Large Spill:**

Corrosive liquid. Oxidizing material. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Avoid contact with a combustible material (wood, paper, oil, clothing...). Keep substance damp using water spray. Do not touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

## Section 7: Handling and Storage

**Precautions:**

Keep locked up.. Keep container dry. Keep away from heat. Keep away from sources of ignition. Keep away from combustible material.. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Never add water to this product. In case of insufficient

ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, reducing agents, combustible materials, organic materials, metals, acids, alkalis.

**Storage:**

Keep container tightly closed. Keep container in a cool, well-ventilated area. Separate from acids, alkalies, reducing agents and combustibles. See NFPA 43A, Code for the Storage of Liquid and Solid Oxidizers. Do not store above 8°C (46.4°F). Refrigerate. Sensitive to light. Store in light-resistant containers.

## Section 8: Exposure Controls/Personal Protection

**Engineering Controls:**

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

**Personal Protection:**

Face shield. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves. Boots.

**Personal Protection in Case of a Large Spill:**

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

**Exposure Limits:**

Hydrogen Peroxide TWA: 1 (ppm) from ACGIH (TLV) [United States] TWA: 1 (ppm) from OSHA (PEL) [United States] TWA: 1 STEL: 2 [Canada] TWA: 1.4 (mg/m<sup>3</sup>) from NIOSH TWA: 1.4 (mg/m<sup>3</sup>) from OSHA (PEL) [United States] TWA: 1 (ppm) [United Kingdom (UK)] TWA: 1.4 (mg/m<sup>3</sup>) [United Kingdom (UK)] Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Liquid.

**Odor:** Odorless.

**Taste:** Slight acid. Bitter

**Molecular Weight:** Not applicable.

**Color:** Clear Colorless.

**pH (1% soln/water):** Not available

**Boiling Point:** 108°C (226.4°F)

**Melting Point:** -33°C (-27.4°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 1.2 (Water = 1)

**Vapor Pressure:** 3.1 kPa (@ 20°C)

**Vapor Density:** 1.1 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** See solubility in water, diethyl ether.

**Solubility:**

Easily soluble in cold water. Soluble in diethyl ether.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable. It contains a stabilizer.

**Instability Temperature:** Not available.

**Conditions of Instability:** Heat, Combustible materials, incompatible materials, light

**Incompatibility with various substances:** Reactive with reducing agents, combustible materials, organic materials, metals, acids, alkalis.

**Corrosivity:** Non-corrosive in presence of glass.

### Special Remarks on Reactivity:

Light sensitive. Incompatible with reducing materials, ethers (dioxane, furfuran, tetrahydrofuran), oxidizing materials, Metals(eg. potassium, sodium lithium, iron, copper, brass, bronze, chromium, zinc, lead, silver, nickel), metal oxides (eg. cobalt oxide, iron oxide, lead oxide, lead hydroxide, manganese oxide), metal salts (eg. calcium permanganate, salts of iron), manganese, asbestos, vanadium, platinum, tungsten, molybdenum, triethylamine, palladium, sodium pyrophosphate, carboxylic acids, cyclopentadiene, formic acid, rust, ketones, sodium carbonate, alcohols, sodium borate, aniline, mercurous chloride, rust, nitric acid, sodium pyrophosphate, hexavalent chromium compounds, tetrahydrofuran, sodium fluoride organic matter, potassium permanganate, urea, chlorosulfonic acid, manganese dioxide, hydrogen selenide, charcoal, coal, sodium borate, alkalis, cyclopentadiene, glycerine, cyanides (potassium, cyanide, sodium cyanide), nitrogen compounds.. Caused to decompose catalytically by metals (in order of decreasing effectiveness): Osmium, Palladium, Platinum, Iridium, Gold, Silver, Manganese, Cobalt, Copper, Lead. Concentrated hydrogen peroxide may decompose violently or explosively in contact with iron, copper, chromium, and most other metals and their salts, and dust. (Hydrogen Peroxide)

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

**Routes of Entry:** Absorbed through skin. Dermal contact. Eye contact.

### Toxicity to Animals:

Acute oral toxicity (LD50): 4000 mg/kg (Mouse) (Calculated value for the mixture). Acute dermal toxicity (LD50): 4000 mg/kg ( pig) (Calculated value for the mixture).

### Chronic Effects on Humans:

CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH [Hydrogen Peroxide]. Classified 3 (Not classifiable for human.) by IARC [Hydrogen Peroxide]. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. [Hydrogen Peroxide]. Mutagenic for bacteria and/or yeast. [Hydrogen Peroxide]. Contains material which may cause damage to the following organs: blood, upper respiratory tract, skin, eyes, central nervous system (CNS).

### Other Toxic Effects on Humans:

Very hazardous in case of skin contact (irritant). Hazardous in case of skin contact (corrosive, permeator), of eye contact (corrosive), of ingestion, of inhalation (lung corrosive).

**Special Remarks on Toxicity to Animals:** Not available.

### Special Remarks on Chronic Effects on Humans:

May cause cancer and may affect genetic material based on animal data. May be tumorigenic. (Hydrogen Peroxide)

### Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: Causes severe skin irritation and possible burns. Absorption into skin may affect behavior/central nervous system (tremor, ataxia, convulsions), respiration (dyspnea, pulmonary emboli), brain. Eyes: Causes severe eye irritation, superficial clouding, corneal edema, and may cause burns. Inhalation: Causes respiratory tract irritation with coughing, lacrimation. May cause chemical burns to the respiratory tract. May affect behavior/Central nervous system (insomnia, headache, ataxia, nervous tremors with numb extremities) and may cause ulceration of nasal tissue, and , chemical

pneumonia, unconsciousness, and possible death. At high concentrations, respiratory effects may include acute lung damage, and delayed pulmonary edema. May affect blood. Ingestion: Causes gastrointestinal tract irritation with nausea, vomiting, hypermotility, and diarrhea. Causes

## Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The products of degradation are less toxic than the product itself.

**Special Remarks on the Products of Biodegradation:** Not available.

## Section 13: Disposal Considerations

**Waste Disposal:**

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

## Section 14: Transport Information

**DOT Classification:**

Class 8: Corrosive material CLASS 5.1: Oxidizing material.

**Identification:** : Hydrogen Peroxide, Aqueous Solution UNNA: 2014 PG: II

**Special Provisions for Transport:** Not available.

## Section 15: Other Regulatory Information

**Federal and State Regulations:**

New York acutely hazardous substances: Hydrogen Peroxide Rhode Island RTK hazardous substances: Hydrogen Peroxide Pennsylvania RTK: Hydrogen Peroxide Florida: Hydrogen Peroxide Minnesota: Hydrogen Peroxide Massachusetts RTK: Hydrogen Peroxide New Jersey: Hydrogen Peroxide TSCA 8(b) inventory: Hydrogen Peroxide SARA 302/304/311/312 extremely hazardous substances: Hydrogen Peroxide CERCLA: Hazardous substances.: Hydrogen Peroxide: 1 lbs. (0.4536 kg);

**Other Regulations:** OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

**Other Classifications:**

**WHMIS (Canada):**

CLASS C: Oxidizing material. CLASS E: Corrosive liquid. CLASS F: Dangerously reactive material.

**DSCL (EEC):**

R16- Explosive when mixed with oxidizing substances. R34- Causes burns. S3- Keep in a cool place. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S28- After contact with skin, wash immediately with plenty of [\*\*\*] S36/37/39- Wear suitable protective clothing, gloves and eye/face protection. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

**HMIS (U.S.A.):**

**Health Hazard:** 3

**Fire Hazard:** 0

**Reactivity:** 1

**Personal Protection:**

**National Fire Protection Association (U.S.A.):**

**Health:** 2

**Flammability:** 0

**Reactivity:** 1

**Specific hazard:**

**Protective Equipment:**

Gloves. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Face shield.

## Section 16: Other Information

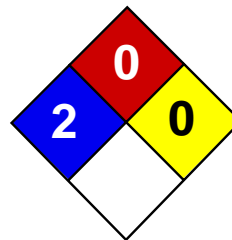
**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/09/2005 05:46 PM

**Last Updated:** 11/06/2008 12:00 PM

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Health	2
Fire	0
Reactivity	0
Personal Protection	E

## Material Safety Data Sheet

### Ferrous sulfate MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** Ferrous sulfate

**Catalog Codes:** SLF1516

**CAS#:** 13463-43-9

**RTECS:** Not available.

**TSCA:** TSCA 8(b) inventory: No products were found.

**CI#:** Not available.

**Synonym:** Ferrous Sulfate Hydrate; Ferrous Sulfate Dried Powder

**Chemical Name:** Ferrous Sulfate

**Chemical Formula:**  $\text{FeSO}_4 \cdot x\text{H}_2\text{O}$

#### Contact Information:

**Sciencelab.com, Inc.**

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: [ScienceLab.com](http://ScienceLab.com)

**CHEMTREC (24HR Emergency Telephone), call:**

1-800-424-9300

**International CHEMTREC, call:** 1-703-527-3887

**For non-emergency assistance, call:** 1-281-441-4400

#### Section 2: Composition and Information on Ingredients

##### Composition:

Name	CAS #	% by Weight
Ferrous sulfate	13463-43-9	100

**Toxicological Data on Ingredients:** Ferrous sulfate LD50: Not available. LC50: Not available.

#### Section 3: Hazards Identification

**Potential Acute Health Effects:** Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

##### Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to kidneys, liver, cardiovascular system, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

#### Section 4: First Aid Measures

##### Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention.

**Skin Contact:**

In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

**Serious Skin Contact:**

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

**Inhalation:**

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

**Serious Inhalation:** Not available.

**Ingestion:**

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

**Serious Ingestion:** Not available.

## Section 5: Fire and Explosion Data

**Flammability of the Product:** Non-flammable.

**Auto-Ignition Temperature:** Not applicable.

**Flash Points:** Not applicable.

**Flammable Limits:** Not applicable.

**Products of Combustion:** Not available.

**Fire Hazards in Presence of Various Substances:** Not applicable.

**Explosion Hazards in Presence of Various Substances:**

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

**Fire Fighting Media and Instructions:** Not applicable.

**Special Remarks on Fire Hazards:** Not available.

**Special Remarks on Explosion Hazards:** Not available.

## Section 6: Accidental Release Measures

**Small Spill:**

Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

**Large Spill:**

Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

## Section 7: Handling and Storage

**Precautions:**

Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If you feel unwell, seek medical attention and show the label when possible. Avoid contact with skin and eyes.

**Storage:**

Hygroscopic. Keep container tightly closed. Keep container in a cool, well-ventilated area. Do not store above 24°C (75.2°F).

**Section 8: Exposure Controls/Personal Protection****Engineering Controls:**

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

**Personal Protection:**

Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

**Personal Protection in Case of a Large Spill:**

Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

**Exposure Limits:** Not available.

**Section 9: Physical and Chemical Properties**

**Physical state and appearance:** Solid.

**Odor:** Not available.

**Taste:** Not available.

**Molecular Weight:** 151.9 g/mole + H<sub>2</sub>O

**Color:** Grayish -white to yellowish. (Light.)

**pH (1% soln/water):** Not available.

**Boiling Point:** Not available.

**Melting Point:** Not available.

**Critical Temperature:** Not available.

**Specific Gravity:** Not available.

**Vapor Pressure:** Not applicable.

**Vapor Density:** Not available.

**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** See solubility in water.

**Solubility:** Soluble in cold water.

**Section 10: Stability and Reactivity Data**

**Stability:** The product is stable.

**Instability Temperature:** Not available.



**Conditions of Instability:** Incompatibles

**Incompatibility with various substances:** Not available.

**Corrosivity:** Not available.

**Special Remarks on Reactivity:**

Hygroscopic. Loses water at about 300 C. No other information found.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

**Routes of Entry:** Inhalation. Ingestion.

**Toxicity to Animals:**

LD50: Not available. LC50: Not available.

**Chronic Effects on Humans:** May cause damage to the following organs: kidneys, liver, cardiovascular system, central nervous system (CNS).

**Other Toxic Effects on Humans:** Hazardous in case of skin contact (irritant), of ingestion, of inhalation.

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** May affect genetic material (mutagenic)

**Special Remarks on other Toxic Effects on Humans:**

Acute Potential Health Effects: Skin: May cause skin irritation. Eyes: May cause eye irritation. Inhalation: May cause respiratory tract irritation. Ingestion: Harmful if swallowed. May cause gastrointestinal tract disturbances and irritation with nausea, vomiting, colic, constipation, diarrhea, black stool. May also affect behavior/Central Nervous System (somnolence -general depressed activity), respiration, cardiovascular system, liver, kidneys (pink urine discoloration). Chronic Potential Health Effects: Repeated exposure via ingestion may increase iron levels in the liver, and spleen. Damage may occur to spleen and liver.

## Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The product itself and its products of degradation are not toxic.

**Special Remarks on the Products of Biodegradation:** Not available.

## Section 13: Disposal Considerations

**Waste Disposal:**

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

## Section 14: Transport Information

**DOT Classification:** Not a DOT controlled material (United States).

**Identification:** Not applicable.

**Special Provisions for Transport:** Not applicable.

## Section 15: Other Regulatory Information

**Federal and State Regulations:** No products were found.

**Other Regulations:** OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

**Other Classifications:**

**WHMIS (Canada):** Not controlled under WHMIS (Canada).

**DSCL (EEC):**

R36/38- Irritating to eyes and skin. S2- Keep out of the reach of children. S46- If swallowed, seek medical advice immediately and show this container or label.

**HMIS (U.S.A.):**

**Health Hazard:** 2

**Fire Hazard:** 0

**Reactivity:** 0

**Personal Protection:** E

**National Fire Protection Association (U.S.A.):**

**Health:** 2

**Flammability:** 0

**Reactivity:** 0

**Specific hazard:**

**Protective Equipment:**

Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Splash goggles.

## Section 16: Other Information

**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/09/2005 05:33 PM

**Last Updated:** 11/06/2008 12:00 PM

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## Material Safety Data Sheet

Science Stuff, Inc.  
1104 Newport Ave  
Austin, TX 78753

Phone (512) 837-6020  
Chemtrec 800-424-9300  
24 Hour Emergency Assistance

Section 1 Identification					
Product Number: C2549					
Product Name: Sodium Carbonate (Soda Ash) Laboratory Grade, Granular		Health: 1			
		Flammability: 0			
		Reactivity: 0			
Trade/Chemical Synonyms		Hazard Rating: Least Slight Moderate High Extreme 0 1 2 3 4			
Formula: Na <sub>2</sub> CO <sub>3</sub>		NA = Not Applicable NE = Not Established			
RTECS: VZ4050000					
C.A.S. CAS# 497-19-8					
Section 2 Component Mixture					
Sara 313	Component	CAS Number	%	Dim	Exposure Limits:
<input type="checkbox"/>	Sodium Carbonate (Soda Ash)	CAS# 497-19-8	100%	W/W	None Established
Section 3 Hazard Identification (Also see section 11)					
Harmful if swallowed. May cause irritation. Avoid breathing vapors, or dusts. Use with adequate ventilation. Avoid contact with eyes, skin, and clothes. Wash thoroughly after handling. Keep container closed.					
Section 4 First Aid Measures					
Harmful if swallowed. May cause irritation. Avoid breathing vapors, or dusts. Use with adequate ventilation. Avoid contact with eyes, skin, and clothes. Wash thoroughly after handling. Keep container closed.					
FIRST AID: SKIN: Wash exposed area with soap and water. If irritation persists, seek medical attention.					
EYES: Wash eyes with plenty of water for at least 15 minutes, lifting lids occasionally. Seek Medical Aid. INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen					
INGESTION: If swallowed, induce vomiting immediately after giving two glasses of water. Never give anything by mouth to an unconscious person.					
Section 5 Fire Fighting Measures					
Fire Extinguisher Any means suitable for extinguishing surrounding fire Type:					
Section 6 Accidental Release Measures					
Wear Protective equipment. Sweep up, place in a bag and hold for waste disposal. Flush residue and liquid spills to holding area for neut. Before discharge.					
Section 7 Handling and Storage					
Store in a cool, dry, well-ventilated place away from incompatible materials. Wash thoroughly after handling.					
Section 8 Exposure Controls & Personal Protection					
Respiratory Protection: NIOSH approved dust mask					
Mechanical: <input type="checkbox"/> Hand Wear appropriate gloves to Protection: prevent skin exposure					
Ventilation: Local Exhaust: <input checked="" type="checkbox"/> Eye Protection: Goggles and Face Shield					
Other Protective Equipment: Wear appropriate clothing to prevent skin exposure					
Section 9 Physical and Chemical Properties					
Melting Point: 851° C		Specific Gravity: 2.53			
Boiling Point: Decomposes		Percent Volatile by Volume: N/A			
Vapor Pressure: N/A		Evaporation Rate: N/A			
Vapor Density: N/A		Evaporation Standard:			
Solubility in Water: Soluble		Auto ignition Temperature: Not applicable			
Appearance and Odor: White poeder or granules, odorless		Lower Flamm. Limit in Air: Not applicable			
Flash Point: N/A		Upper Flamm. Limit in Air: Not applicable			
Section 10 Stability and Reactivity Information					
Stability: Stable Conditions to Avoid: Application to red-hot aluminum					
Materials to Avoid: Strong oxidizing agents, metals, acids, organics					
Hazardous Decomposition Products: Carbon dioxide, carbon monoxide					
Hazardous Polymerization: Will Not Occur					
Condition to Avoid: None known					
Section 11 Additional Information					

Fire/Explosion Hazards:	Explosion may occur when applied to red-hot aluminum	<div>Effects of overexposure: Acute: May cause eyes burns. Harmful if swallowed. Inhalation of dust may cause respiratory tract irritation, coughing or labored breathing. Excessive contact can damage nasal septum. Ingestion may be corrosive to GI tract, symptoms may include severe abdominal pain, vomiting, diarrhea and collapse. Skin contact may cause irritation w/blistering and redness. May be corrosive to eyes and cause conjunctivitis, edema and corneal distruction. Chronic: Prolonged or prolonged contact may cause sensitization. Conditions aggravated/target organs: Persons with pre-existing eye, skin or respiratory conditions may be more susceptible</div> <div>DOT Classification: Not Regulated</div> <div>DOT regulations may change from time to time. Please consult the most recent version of the relevant regulations.</div> <div>Revision No:0      Date Entered: 9/1/2006      Approved by: WPF</div>
Fire Fighting Procedure:	Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and clothing.	

The information contained herein is believed to be accurate and is offered in good faith for the user's consideration and investigation. No warranty is expressed or implied regarding the completeness or accuracy of this information, whether originating from Science Stuff, Inc. or from an alternate source. Users of this material should satisfy themselves by independent investigation of current scientific and medical information that this material may be safely handled.

# CHEMICAL PRODUCTS CORPORATION

## MATERIAL SAFETY DATA SHEET

MSDS No. 47E

Revised Nov. 02

Page 1 of 7 Pages

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### 1. PRODUCT IDENTIFIER

NAME: **Sodium Hydrosulfide Solution**

SYNONYMS: Sodium Hydrogen Sulfide Solution; Sodium Bisulfide Solution; Sodium Sulfhydrate Solution.

MANUFACTURER: Chemical Products Corporation (CPC)  
P.O. Box 2470  
102 Old Mill Road, S.E.  
Cartersville, Georgia 30120-1692  
Telephone: Day, 770-382-2144; Night, 770-382-2212

24-hour Emergency Phone Number: CHEMTREC 800-42409300

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### 2. INFORMATION ON INGREDIENTS

<u>COMPONENT</u>	<u>CAS #</u>	<u>EXPOSURE LIMITS</u>	<u>% BY WT</u>
Sodium Hydrosulfide	16721-80-5	No ACGIH TLV or OSHA PEL established for Sodium Hydrosulfide.  For Hydrogen Sulfide gas: OSHA PEL - 20 ppm. ACGIH TLV-TWA - 10 ppm	18 - 22 %
Water	7732-18-5		78 - 82 %

---

### 3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: **DANGER!** CAUSES SEVERE BURNS TO EYES, DIGESTIVE TRACT, AND SKIN. THIS IS A HIGHLY ALKALINE LIQUID. HARMFUL IF SWALLOWED. HARMFUL IF MIST IS INHALED. Do not taste or swallow. Avoid skin contact. Use only with adequate ventilation. Wash thoroughly after handling. CONTACT WITH ACID RELEASES POISONOUS AND FLAMMABLE HYDROGEN SULFIDE GAS.

POTENTIAL HEALTH EFFECTS: Chemical burns result from contact with liquid or mist. Hydrogen sulfide gas exposure causes eye irritation, headache, and dizziness. Acute exposure to hydrogen sulfide gas causes unconsciousness and paralysis of breathing muscles leading to death.

**Routes of Entry:** Ingestion, skin absorption, and possibly inhalation.

**Human Effects:** High alkalinity makes this product corrosive to mucous membranes - chemical burns result from contact. Mists and vapors cause irritation to the conjunctiva and cornea of the eye.

**Acute Inhalation:** Severe respiratory distress because of corrosivity. Hydrogen sulfide gas, produced if this product contacts acid, causes confusion, weakness of the extremities, unconsciousness, pulmonary edema, asphyxiation and central respiratory paralysis leading to death.

**Chronic Inhalation:** Extreme irritation to respiratory passages.

**Acute Skin Contact:** Painful chemical burns. Systemic poisoning by sulfide causes headache, nausea, dizziness, confusion, weakness of the extremities, and possible unconsciousness.

**Chronic Skin Contact:** Extreme irritation to skin.

**Acute Eye Contact:** Alkali burns to conjunctiva and cornea with possible irreversible destruction of tissue.

**Chronic Eye Contact:** Extreme irritation to the eyes caused by vapor or mist; corneal opacity.

**Acute Ingestion:** Destruction of the lining of the esophagus and stomach. Rapid breathing, confusion, unconsciousness, paralysis of respiratory muscles leading to death.

**Chronic Ingestion:** Headache, nausea, dizziness, confusion, and painful alkali burns to the esophagus.

**Carcinogenicity:** NTP.....: Not listed. IARC.....: Not listed. OSHA.....: Not regulated.

**Medical Conditions Aggravated by Exposure:** None are known.

---

## 4. FIRST AID MEASURES

If swallowed, do not induce vomiting unless directed to do so by medical personnel. Have victim drink as much milk or water as possible. Never give anything by mouth to an unconscious person.

If mist is inhaled, remove to fresh air. Get medical attention immediately and contact a poison control center.

For eye contact, flush eyes with large amounts of water for at least 15 minutes and get IMMEDIATE medical attention. For skin contact, wash with soap and water. Wash clothing before reuse.

**Physician:** Contact causes caustic burns. Treat ingestion as hydrogen sulfide gas poisoning in addition to caustic burns.

---

## 5. FIRE FIGHTING MEASURES

**Flashpoint:** Non-flammable..

**Flammability:** Hydrogen sulfide can collect in confined spaces above the liquid. It forms flammable mixtures with air from about 4% vapor up to about 45%.

**Autoignition:** Not applicable.

**General Hazard:** Poison, flammable hydrogen sulfide gas will be evolved from this product on exposure to acid or excessive heat.

**Fire Fighting Instructions:** Firefighters should wear self-contained breathing apparatus. Do not use carbon dioxide fire extinguishers because toxic hydrogen sulfide gas will be liberated from this product.

**Fire Fighting Equipment:** Use water in flooding quantities. A heavy fog of water may be effective in knocking down vapors.

**Hazardous Combustion Products:** Poisonous sulfur dioxide gas will be generated if the vapors from this product burn.

---

## 6. ACCIDENTAL RELEASE MEASURES

**General:** Avoid generating mist and keep this product away from acids. Use appropriate Personnel Protective Equipment (PPE). Spilled product is a RCRA hazardous waste.

**Small Spill:** Absorb in dirt, sawdust, fly ash or other inert absorbant. Scoop up and store in sealed containers. Dispose of in accordance with local, state, or federal regulations.

**Large Spill:** Dike to prevent entry into sewers or drains. Recover as much of the solution as possible. Mix solution with dilute excess hydrogen peroxide to oxidize sulfide and eliminate danger of hydrogen sulfide evolution.

---

## 7. HANDLING AND STORAGE

**Storage Temperature:** Not critical.

**Storage Pressure:** Atmospheric.

**General:** Put a vapor trap or scrubber on tank vent.

--Poison hydrogen sulfide gas will be present in the vapor space above sodium hydrosulfide solution. Do not enter tanks or other vessels that have contained this product unless fresh air breathing apparatus is used.

--Do not store in contact with copper, zinc, or aluminum.

--Preferred material of construction for storage tanks is stainless steel; however, carbon steel is acceptable.

---

## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

**Engineering Controls:** Adequate ventilation is required to remove the toxic and flammable vapors or mist which may be present. Safety shower and eyewash fountain should always be available in the work area.

**Respiratory Protection:** Use self-contained breathing apparatus or supplied-air respirator if the PEL for hydrogen sulfide might be exceeded.

**Skin Protection:** Rubber suits and boots as needed for protection from splashing.

**Eye Protection:** Chemical safety goggles and safety shield for protection from splashing.

---

## 9. PHYSICAL AND CHEMICAL PROPERTIES

**Physical State:** Liquid.

**Vapor Pressure:** Not applicable.

**Specific Gravity:** About 1.18

**Solubility in Water:** Complete.

**pH:** Highly alkaline.

**Boiling Point:** About 107 Deg. C. (225 Deg. F.)

**Melting Point:** About -18 Deg. C. (0 Deg. F.)

**Vapor Density:** Not applicable.

**Evaporation Rate:** Not applicable.

**Odor:** "Rotten egg" odor.

**Appearance:** Yellow to amber liquid.

---

## 10. STABILITY AND REACTIVITY

**Chemical Stability:** Mixing with acids liberates poisonous hydrogen sulfide. Mixing with strong oxidizers causes a violent reaction. Mixing with strong alkalies may form solid, hydrated sodium sulfide.



**Incompatibility:** Acids, strong oxidizers, and strong alkalies.

**Hazardous Decomposition Products:** Very high temperatures will decompose this product to form poisonous hydrogen sulfide gas.

**Hazardous Polymerization:** Does not occur.

---

## 11. TOXICOLOGICAL INFORMATION

**Eye:** Corrosive due to product's alkalinity.

**Skin:** Corrosive to skin due to product's alkalinity. May be toxic when absorbed through skin.

**Ingestion:** TOXIC - Human Oral LD<sub>50</sub> reported to be 50 mg/kg for Na<sub>2</sub>S. Equivalent to 163 mg/kg for this product (based on sulfur content).

**Inhalation:** TOXIC - Hydrogen sulfide inhalation is assumed. Human LC<sub>50</sub> is 600 ppm for 30 minutes for hydrogen sulfide; equivalent to 4500 ppm of respirable mist from this product.

**Sub-chronic:** Irritation to the conjunctiva and cornea of the eye from vapors.

**Chronic/Carcinogenic:** Not a known carcinogen. Chronic acute exposures to vapors may cause neurologic deficits like those in survivors of other severe asphyxiant poisonings.

**Teratogenic:** Not known.

**Reproductive:** Not known.

**Mutagenic:** Not known.

---

## 12. ECOLOGICAL INFORMATION

**TOXICITY:** Toxic to aquatic organisms. Sulfide ion reacts with oxygen; waters containing sulfide ion will not contain dissolved oxygen.

**DISTRIBUTION:** All components of this product are found naturally in all ecosystems.

**CHEMICAL FATE:** With dilution, the sulfide will be readily incorporated into the preexisting natural sulfur cycle.

---

### 13. WASTE MANAGEMENT INFORMATION

Waste containing sulfide may be hazardous and may require disposal in an approved hazardous waste landfill. Sulfide can be oxidized with dilute hydrogen peroxide or any other oxidizing agent to non-hazardous sulfate; care should be taken as the reaction may be violent.

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### 14. TRANSPORT INFORMATION

**D.O.T. Shipping Name.....** : Corrosive liquids, toxic, n.o.s..

**Technical Shipping Name.....** : Sodium hydrosulfide solution.

**D.O.T. Hazard Class.....** : 8 - CORROSIVE, PGII.

**U.N./N.A. Number.....** : UN 2922.

**Product R.Q. (lbs).....** : 5000 lbs. of Sodium hydrosulfide;  
22,700 lbs. of this product.

**D.O.T. Label.....** : CORROSIVE.

**D.O.T. Placard.....** : CORROSIVE.

**Freight Class Bulk.....** : Inorganic Chemical.

**Freight Class Package.....** : Inorganic Chemical.

**Product Label.....** : Sodium hydrosulfide solution.

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### 15. REGULATORY INFORMATION

**OSHA Status.....** : This product is hazardous under the criteria of the Federal OSHA Hazard Communication Standard, 29 CFR 1910.1200. It is classified as toxic based on ingestion information and corrosive based on its alkalinity.

**TSCA Status.....** : Listed on TSCA Inventory.

**CERCLA Reportable Quantity.....** : 5000 lbs. of Sodium Hydrosulfide  
22,700 lbs. of this product.

**SARA Title III:**

Section 302, Extremely Hazardous Substances.... : None.

Section 311/312, Hazard Categories..... : Category 1 (Acute Hazard).

Section 313, Toxics Release Inventory..... : None.

**RCRA Status.....:** If discarded in its purchased form, this product could be a hazardous waste because of its alkalinity and/or sulfide content. Under RCRA, it is the responsibility of the product user to determine at the time of disposal whether a material containing or derived from this product should be classified as a hazardous waste under 40 CFR 261.20-24.

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## 16. OTHER INFORMATION

**NFPA Rating (National Fire Protection Association):**

Health -3 (Materials which on short exposure could cause serious temporary or residual injury).

Fire -1 (Materials which will burn in air when exposed to a temperature of 1500 Deg. F).

Reactivity -1 (Materials which are normally stable but which can become unstable at elevated temperature and pressure).

Special - NA

**Reason for Issue.....:** Change in U.S. Department of Transportation Regulations.

**Prepared by..... :** Jerry A. Cook.

**Title..... :** Technical Director.

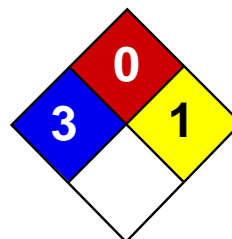
**Approval Date..... :** November, 2002.

**Supersedes Date..... :** March, 2002.

**MSDS Number..... :** 47E

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Health	3
Fire	0
Reactivity	1
Personal Protection	

## Material Safety Data Sheet

### Sodium Hydroxide, 50% MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** Sodium Hydroxide, 50%

**Catalog Codes:** SLS3127, SLS4549

**CAS#:** Mixture.

**RTECS:** Not applicable.

**TSCA:** TSCA 8(b) inventory: Sodium hydroxide; Water

**CI#:** Not applicable.

**Synonym:** Sodium Hydroxide, 50% Solution

**Chemical Name:** Not applicable.

**Chemical Formula:** Not applicable.

#### Contact Information:

**Sciencelab.com, Inc.**

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: [ScienceLab.com](http://ScienceLab.com)

**CHEMTREC (24HR Emergency Telephone), call:**

1-800-424-9300

**International CHEMTREC, call:** 1-703-527-3887

**For non-emergency assistance, call:** 1-281-441-4400

#### Section 2: Composition and Information on Ingredients

##### Composition:

Name	CAS #	% by Weight
Sodium hydroxide	1310-73-2	50
Water	7732-18-5	50

**Toxicological Data on Ingredients:** Sodium hydroxide LD50: Not available. LC50: Not available.

#### Section 3: Hazards Identification

##### Potential Acute Health Effects:

Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (irritant, corrosive), of ingestion, . Slightly hazardous in case of inhalation (lung sensitizer). Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Severe over-exposure can result in death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

##### Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to lungs. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation

leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

#### Section 4: First Aid Measures

**Eye Contact:**

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Get medical attention immediately. Finish by rinsing thoroughly with running water to avoid a possible infection.

**Skin Contact:**

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

**Serious Skin Contact:**

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

**Inhalation:**

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

**Serious Inhalation:**

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

**Ingestion:**

If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

**Serious Ingestion:** Not available.

#### Section 5: Fire and Explosion Data

**Flammability of the Product:** Non-flammable.

**Auto-Ignition Temperature:** Not applicable.

**Flash Points:** Not applicable.

**Flammable Limits:** Not applicable.

**Products of Combustion:** Not available.

**Fire Hazards in Presence of Various Substances:** Not applicable.

**Explosion Hazards in Presence of Various Substances:** Non-explosive in presence of open flames and sparks, of shocks.

**Fire Fighting Media and Instructions:** Not applicable.

**Special Remarks on Fire Hazards:** Not available.

**Special Remarks on Explosion Hazards:**

Sodium hydroxide reacts to form explosive products with ammonia + silver nitrate. Benzene extract of allyl benzenesulfonate prepared from allyl alcohol, and benzene sulfonyl chloride in presence of aqueous sodium hydroxide, under vacuum distillation, residue darkened and exploded. Sodium Hydroxide + impure tetrahydrofuran, which can contain peroxides, can cause serious explosions. Dry mixtures of sodium hydroxide and sodium tetrahydroborate liberate hydrogen explosively at 230-270 deg. C. Sodium Hydroxide reacts with sodium salt of trichlorophenol + methyl alcohol + trichlorobenzene + heat to cause an explosion. (Sodium hydroxide)

## Section 6: Accidental Release Measures

### Small Spill:

Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: Neutralize the residue with a dilute solution of acetic acid.

### Large Spill:

Corrosive liquid. Poisonous liquid. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of acetic acid. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

## Section 7: Handling and Storage

### Precautions:

Do not ingest. Do not breathe gas/fumes/ vapor/spray. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, reducing agents, metals, acids, alkalis, moisture.

**Storage:** Keep container tightly closed. Keep container in a cool, well-ventilated area.

## Section 8: Exposure Controls/Personal Protection

### Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value.

### Personal Protection:

Face shield. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves. Boots.

### Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

### Exposure Limits:

Sodium hydroxide STEL: 2 (mg/m<sup>3</sup>) from ACGIH (TLV) [United States] TWA: 2 CEIL: 2 (mg/m<sup>3</sup>) from OSHA (PEL) [United States] CEIL: 2 (mg/m<sup>3</sup>) from NIOSH Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Liquid.

**Odor:** Odorless.

**Taste:** Alkaline. Bitter. (Strong.)

**Molecular Weight:** Not applicable.

**Color:** Clear Colorless.

**pH (1% soln/water):** Basic.

**Boiling Point:** 140°C (284°F)

**Melting Point:** 12°C (53.6°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 1.53 (Water = 1)

**Vapor Pressure:** The highest known value is 2.3 kPa (@ 20°C) (Water).

**Vapor Density:** The highest known value is 0.62 (Air = 1) (Water).

**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** See solubility in water.

**Solubility:** Easily soluble in cold water.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Excess heat, incompatible materials, water/moisture

**Incompatibility with various substances:**  
Reactive with oxidizing agents, reducing agents, metals, acids, alkalis. Slightly reactive with water

**Corrosivity:**  
Extremely corrosive in presence of aluminum, brass. Corrosive in presence of copper, of stainless steel(304), of stainless steel(316). Non-corrosive in presence of glass.

**Special Remarks on Reactivity:**  
Hygroscopic. Much heat is evolved when solid material is dissolved in water. Therefore cold water and caution must be used for this process. Generates considerable heat when a sodium hydroxide solution is mixed with an acid Sodium hydroxide solution and octanol + diborane during a work-up of a reaction mixture of oxime and diborane in tetrahydrofuran is very exothermic, a mild explosion being noted on one occassion. Reactive with water, acids (mineral, non-oxidizing, e.g. hydrochloric, hydrofluoric acid, muriatic acid, phosphoric), acids (mineral, oxidizing e.g. chromic acid, hypochlorous acid, nitric acid, sulfuric acid), acids (organic e.g. acetic acid, benzoic acid, formic acid, methanoic acid, oxalic acid), aldehydes (e.g. acetaldehyde, acrolein, chloral hydrate, foraldehyde), carbamates (e.g. carbanolate, carbofuran), esters (e.g. butyl acetate, ethyl acetate, propyl formate), halogenated organics (dibromoethane, hexachlorobenzene, methyl chloride, trichloroethylene), isocyanates (e.g. methyl isocyanate), ketones (acetone, acetophenone, MEK, MIBK), acid chlorides, strong bases, strong oxidizing agents, strong reducing agents, flammable liquids, powdered metals and metals (i.e aluminum, tin, zinc, hafnium, raney nickel), metals (alkali and alkaline e.g. cesium, potassium, sodium), metal compounds (toxic e.g. beryllium, lead acetate, nickel carbonyl, tetraethyl lead), mitrides (e.g. potassium nitride, sodium nitride), nitriles (e.g. acetonitrile, methyl cyanide), nitro compounds (organic e.g. nitrobenzene, nitromethane), acetic anhydride, hydroquinone, chlorohydrin, chlorosulfonic acid, ethylene cyanohydrin, glyoxal, hydrosulfuric acid, oleum, propiolactone, acylonitrile, phorosous pentoxide, chloroethanol, chloroform-methanol, tetrahydroborate, cyanogen azide, 1,2,4,5 tetrachlorobenzene, cinnamaldehyde. Reacts with formaldehyde hydroxide to yield formic acid, and hydrogen. (Sodium hydroxide)

**Special Remarks on Corrosivity:** Very caustic to aluminum and other metals in presence of moisture.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

**Routes of Entry:** Absorbed through skin. Dermal contact. Eye contact. Inhalation.

**Toxicity to Animals:**  
LD50: Not available. LC50: Not available.

**Chronic Effects on Humans:** Not available.

**Other Toxic Effects on Humans:**

Extremely hazardous in case of inhalation (lung corrosive). Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (corrosive), of ingestion, .

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** Investigation as a mutagen (cytogenetic analysis), but no data available. (Sodium hydroxide)

**Special Remarks on other Toxic Effects on Humans:**

Acute Potential Health Effects: Skin: May be harmful if absorbed through skin. Causes severe skin irritation and burns. May cause deep penetrating ulcers of the skin. Eyes: Causes severe eye irritation and burns. May cause chemical conjunctivitis and corneal damage. Inhalation: Harmful if inhaled. Causes severe irritation of the respiratory tract and mucous membranes with coughing, burns, breathing difficulty, and possible coma. Irritation may lead the chemical pneumonitis and pulmonary edema. Causes chemical burns to the respiratory tract and mucous membranes. Ingestion: May be fatal if swallowed. May cause severe and permanent damage to the digestive tract. Causes

**Section 12: Ecological Information**

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The products of degradation are less toxic than the product itself.

**Special Remarks on the Products of Biodegradation:** Not available.

**Section 13: Disposal Considerations****Waste Disposal:**

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

**Section 14: Transport Information**

**DOT Classification:** Class 8: Corrosive material

**Identification:** : Sodium hydroxide, solution (Sodium hydroxide) UNNA: UN1824 PG: II

**Special Provisions for Transport:** Not available.

**Section 15: Other Regulatory Information****Federal and State Regulations:**

Illinois toxic substances disclosure to employee act: Sodium hydroxide Illinois chemical safety act: Sodium hydroxide New York release reporting list: Sodium hydroxide Rhode Island RTK hazardous substances: Sodium hydroxide Pennsylvania RTK: Sodium hydroxide Minnesota: Sodium hydroxide Massachusetts RTK: Sodium hydroxide New Jersey: Sodium hydroxide Louisiana spill reporting: Sodium hydroxide TSCA 8(b) inventory: Sodium hydroxide; Water CERCLA: Hazardous substances.: Sodium hydroxide: 1000 lbs. (453.6 kg);

**Other Regulations:** OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

**Other Classifications:**

**WHMIS (Canada):**



CLASS D-2A: Material causing other toxic effects (VERY TOXIC). CLASS E: Corrosive liquid.

**DSCL (EEC):**

**HMIS (U.S.A.):**

**Health Hazard:** 3

**Fire Hazard:** 0

**Reactivity:** 1

**Personal Protection:**

**National Fire Protection Association (U.S.A.):**

**Health:** 3

**Flammability:** 0

**Reactivity:** 1

**Specific hazard:**

**Protective Equipment:**

Gloves. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Face shield.

## Section 16: Other Information

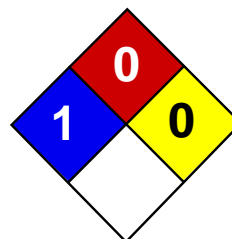
**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/09/2005 06:32 PM

**Last Updated:** 11/06/2008 12:00 PM

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Health	3
Fire	0
Reactivity	0
Personal Protection	

## Material Safety Data Sheet

### Sodium Hypochlorite, 5% MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** Sodium Hypochlorite, 5%

**Catalog Codes:** SLS1654

**CAS#:** Mixture.

**RTECS:** Not applicable.

**TSCA:** TSCA 8(b) inventory: Sodium hypochlorite; Sodium hydroxide; Water

**CI#:** Not applicable.

**Synonym:** Chlorine Bleach, Bleach, Soda Bleach, Chlorox; Sodium Hypochlorite, Solution, 5% Available Chlorine

**Chemical Name:** Hypochlorous acid, sodium salt, solution

**Chemical Formula:** Not applicable.

#### Contact Information:

**Sciencelab.com, Inc.**

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: [ScienceLab.com](http://ScienceLab.com)

**CHEMTREC (24HR Emergency Telephone), call:**

1-800-424-9300

**International CHEMTREC, call:** 1-703-527-3887

**For non-emergency assistance, call:** 1-281-441-4400

#### Section 2: Composition and Information on Ingredients

##### Composition:

Name	CAS #	% by Weight
Sodium hypochlorite	7681-52-9	4-7
Sodium hydroxide	1310-73-2	<1
Water	7732-18-5	>92

**Toxicological Data on Ingredients:** Sodium hypochlorite: ORAL (LD50): Acute: 5800 mg/kg [Mouse]. 8910 mg/kg [Rat].

#### Section 3: Hazards Identification

##### Potential Acute Health Effects:

Very hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, . Hazardous in case of skin contact (corrosive), of eye contact (corrosive). Slightly hazardous in case of inhalation (lung sensitizer). Non-corrosive for lungs. Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Prolonged exposure may result in skin burns and ulcerations. Over-exposure by inhalation may cause respiratory irritation. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

**Potential Chronic Health Effects:**

Slightly hazardous in case of skin contact (sensitizer). CARCINOGENIC EFFECTS: Classified 3 (Not classifiable for human.) by IARC [Sodium hypochlorite]. MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. [Sodium hypochlorite]. Mutagenic for mammalian somatic cells. [Sodium hydroxide]. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to lungs, mucous membranes, skin, eyes. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection.

**Section 4: First Aid Measures****Eye Contact:**

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

**Skin Contact:**

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

**Serious Skin Contact:**

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

**Inhalation:**

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

**Serious Inhalation:**

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

**Ingestion:**

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

**Serious Ingestion:** Not available.

**Section 5: Fire and Explosion Data**

**Flammability of the Product:** Non-flammable.

**Auto-Ignition Temperature:** Not applicable.

**Flash Points:** Not applicable.

**Flammable Limits:** Not applicable.

**Products of Combustion:** Not available.

**Fire Hazards in Presence of Various Substances:** combustible materials, metals, organic materials

**Explosion Hazards in Presence of Various Substances:**

Slightly explosive in presence of open flames and sparks. Non-explosive in presence of shocks.

**Fire Fighting Media and Instructions:** Not applicable.

**Special Remarks on Fire Hazards:**

Releases chlorine when heated above 35 deg. C. The substance itself is non-combustible and does not burn. However, when heated to decomposition it emits corrosive and/or toxic fumes. May ignite combustibles. Fire risk in contact with organic materials. Contact with metals may evolve flammable hydrogen gas.

**Special Remarks on Explosion Hazards:**

Anydrous Sodium Hypochlorite is very explosive. Primary amines and calcium hypochlorite or sodium hypochlorite react to form normal chloroamines, which are explosive. Interaction of ethyleneimine with sodium (or other) hypochlorite gives the explosive N-chloro compd. Removal of formic acid from industrial waste streams with sodium hypochlorite soln becomes explosive at 55 deg C. Several explosions involving methanol and sodium hypochlorite were attributed to formation of methyl hypochlorite, especially in presence of acid or other esterification catalyst. Use of sodium hypochlorite soln to destroy acidified benzyl cyanide residues caused a violent explosion, thought to have been due to formation of nitrogen trichloride. (Sodium hypochlorite)

**Section 6: Accidental Release Measures****Small Spill:**

Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.

**Large Spill:**

Corrosive liquid. Oxidizing material. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Avoid contact with a combustible material (wood, paper, oil, clothing...). Keep substance damp using water spray. Do not touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

**Section 7: Handling and Storage****Precautions:**

Keep locked up.. Keep container dry. Keep away from heat. Keep away from sources of ignition. Keep away from combustible material.. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as reducing agents, combustible materials, organic materials, metals, acids.

**Storage:**

Keep container tightly closed. Keep container in a cool, well-ventilated area. Separate from acids, alkalies, reducing agents and combustibles. See NFPA 43A, Code for the Storage of Liquid and Solid Oxidizers. Air Sensitive Sensitive to light. Store in light-resistant containers.

**Section 8: Exposure Controls/Personal Protection****Engineering Controls:**

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value.

**Personal Protection:**

Face shield. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves. Boots.

**Personal Protection in Case of a Large Spill:**

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

**Exposure Limits:**

Sodium hypochlorite TWA: 1 CEIL: 1 (ppm as Cl<sub>2</sub>) STEL: 1 (ppm as Cl<sub>2</sub>) from ACGIH (TLV) [United States] Sodium hydroxide STEL: 2 (mg/m<sup>3</sup>) from ACGIH (TLV) [United States] TWA: 2 CEIL: 2 (mg/m<sup>3</sup>) from OSHA (PEL) [United States] CEIL: 2 (mg/m<sup>3</sup>) from NIOSH Consult local authorities for acceptable exposure limits.

**Section 9: Physical and Chemical Properties**

**Physical state and appearance:** Liquid.

**Odor:** Characteristic. Chlorine-like (Slight.)

**Taste:** Not available.

**Molecular Weight:** Not applicable.

**Color:** Colorless to light greenish yellow

**pH (1% soln/water):** Neutral.

**Boiling Point:** Decomposition temperature: 40°C (104°F)

**Melting Point:** Not available.

**Critical Temperature:** Not available.

**Specific Gravity:** 1.07 - 1.093 (Water = 1)

**Vapor Pressure:** 2.3 kPa (@ 20°C)

**Vapor Density:** The highest known value is 0.62 (Air = 1) (Water).

**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** See solubility in water.

**Solubility:** Easily soluble in cold water.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Incompatible materials. light, air, heat

**Incompatibility with various substances:** Reactive with reducing agents, combustible materials, organic materials, metals, acids.

**Corrosivity:**

Extremely corrosive in presence of aluminum. Corrosive in presence of stainless steel(304), of stainless steel(316). Non-corrosive in presence of glass.

**Special Remarks on Reactivity:**

Decomposed by carbon dioxide from air. Slowly decomposes on contact with air. Unstable in air unless mixed with sodium hydroxide. Incompatible with ammonium acetate, ammonium carbonate, ammonium nitrate, ammonium oxalate, and ammonium phosphate. Decomposition of sodium hypochlorite takes place within a few seconds with these salts. Also incompatible with primary amines, phenyl acetonitrile, ethyleneimine, methanol, acidified benzyl cyanide, formic acid, urea, nitro compounds, methylcellulose, cellulose, aziridine, ether, ammonia. Mixing this product with chemicals (e.g. ammonia, acids, detergents, etc.) or organic matter (e.g. urine, feces, etc.) will release chlorine gas. Chloramine gas may be evolved when ammonia and bleach are mixed. Decomposed by hot water. Sensitive to light. Exposure to light accelerates decomposition.

**Special Remarks on Corrosivity:**

Sodium Hypochlorite is extremely corrosive to brass, and moderately corrosive to bronze. There is no corrosivity information for copper.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

**Routes of Entry:** Absorbed through skin. Eye contact. Inhalation. Ingestion.

**Toxicity to Animals:** Acute oral toxicity (LD50): 5800 mg/kg [Mouse]. (Sodium hypochlorite).

**Chronic Effects on Humans:**

**CARCINOGENIC EFFECTS:** Classified 3 (Not classifiable for human.) by IARC [Sodium hypochlorite]. **MUTAGENIC EFFECTS:** Mutagenic for bacteria and/or yeast. [Sodium hypochlorite]. Mutagenic for mammalian somatic cells. [Sodium hydroxide]. Contains material which may cause damage to the following organs: lungs, mucous membranes, skin, eyes.

**Other Toxic Effects on Humans:**

Very hazardous in case of skin contact (irritant), of ingestion, . Hazardous in case of skin contact (corrosive), of eye contact (corrosive). Slightly hazardous in case of inhalation (lung sensitizer, lung corrosive).

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** May affect genetic material (mutagenic) (Sodium hypochlorite)

**Special Remarks on other Toxic Effects on Humans:**

Potential Health Effects: Can cause severe irritation and possible burns to skin and eyes. Eye contact may also cause corneal and conjunctival edema, conjunctival hemorrhages. Contact with skin may also cause vesicular eruptions and eczematoid dermatitis which becomes evident upon re-exposure. Prolonged or repeated eye contact may cause conjunctivitis. Ingestion can cause burns to the digestive tract. Symptoms may include: 1. pain and inflammation of the mouth, pharynx, esophagus, and stomach, 2. erosion of the mucous membranes (chiefly of the stomach), nausea, vomiting, choking, coughing, hemorrhage, 3. circulatory collapse with cold and clammy skin (due to methemoglobinemia), cyanosis, and shallow respirations, 4. confusion, delirium, coma, 5. edema of the pharynx, glottis, larynx with stridor and obstruction, 6. perforation of the esophagus, or stomach, with mediastinitis or peritonitis. Inhalation causes slight to severe respiratory tract irritation and delayed pulmonary edema. Prolonged or repeated inhalation may cause allergic respiratory reaction (asthma).

## Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The product itself and its products of degradation are not toxic.

**Special Remarks on the Products of Biodegradation:** Not available.

## Section 13: Disposal Considerations

**Waste Disposal:**

Dilute with water and flush to sewer if local ordinances allow, otherwise, whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Waste must be disposed of in accordance with federal, state and local environmental control regulations.

## Section 14: Transport Information

**DOT Classification:** Class 8: Corrosive material

**Identification:** : Hypochlorite solution UNNA: 1791 PG: III

**Special Provisions for Transport:** Not available.

## Section 15: Other Regulatory Information

**Federal and State Regulations:**

Illinois toxic substances disclosure to employee act: Sodium hydroxide Illinois chemical safety act: Sodium hydroxide New York release reporting list: Sodium hydroxide Rhode Island RTK hazardous substances: Sodium hydroxide Pennsylvania RTK: Sodium hypochlorite; Sodium hydroxide Florida: Sodium hypochlorite Minnesota: Sodium hypochlorite; Sodium hydroxide Massachusetts RTK: Sodium hypochlorite; Sodium hydroxide New Jersey: Sodium hypochlorite; Sodium hydroxide Louisiana spill reporting: Sodium hydroxide TSCA 8(b) inventory: Sodium hypochlorite; Sodium hydroxide; Water CERCLA: Hazardous substances.: Sodium hypochlorite: 100 lbs. (45.36 kg); Sodium hydroxide: 1000 lbs. (453.6 kg);

**Other Regulations:** OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

**Other Classifications:**

**WHMIS (Canada):** CLASS E: Corrosive liquid.

**DSCL (EEC):**

R8- Contact with combustible material may cause fire. R31- Contact with acids liberates toxic gas. R36/38- Irritating to eyes and skin. S28- After contact with skin, wash immediately with plenty of water. S36/37/39- Wear suitable protective clothing, gloves and eye/face protection. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

**HMIS (U.S.A.):**

**Health Hazard:** 3

**Fire Hazard:** 0

**Reactivity:** 0

**Personal Protection:**

**National Fire Protection Association (U.S.A.):**

**Health:** 1

**Flammability:** 0

**Reactivity:** 0

**Specific hazard:**

**Protective Equipment:**

Gloves. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Face shield.

**Section 16: Other Information**

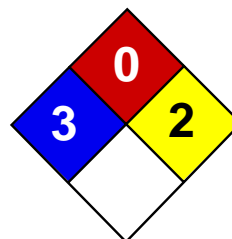
**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/09/2005 06:32 PM

**Last Updated:** 11/06/2008 12:00 PM

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Health	3
Fire	0
Reactivity	2
Personal Protection	

## Material Safety Data Sheet

### Sulfuric acid MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** Sulfuric acid

**Catalog Codes:** SLS2539, SLS1741, SLS3166, SLS2371, SLS3793

**CAS#:** 7664-93-9

**RTECS:** WS5600000

**TSCA:** TSCA 8(b) inventory: Sulfuric acid

**CI#:** Not applicable.

**Synonym:** Oil of Vitriol; Sulfuric Acid

**Chemical Name:** Hydrogen sulfate

**Chemical Formula:** H<sub>2</sub>-SO<sub>4</sub>

#### Contact Information:

**Sciencelab.com, Inc.**

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: [ScienceLab.com](http://ScienceLab.com)

**CHEMTREC (24HR Emergency Telephone), call:**

1-800-424-9300

**International CHEMTREC, call:** 1-703-527-3887

**For non-emergency assistance, call:** 1-281-441-4400

#### Section 2: Composition and Information on Ingredients

##### Composition:

Name	CAS #	% by Weight
Sulfuric acid	7664-93-9	95 - 98

**Toxicological Data on Ingredients:** Sulfuric acid: ORAL (LD50): Acute: 2140 mg/kg [Rat.]. VAPOR (LC50): Acute: 510 mg/m 2 hours [Rat]. 320 mg/m 2 hours [Mouse].

#### Section 3: Hazards Identification

##### Potential Acute Health Effects:

Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (irritant, corrosive), of ingestion, of inhalation. Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Severe over-exposure can result in death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

##### Potential Chronic Health Effects:

**CARCINOGENIC EFFECTS:** Classified 1 (Proven for human.) by IARC, + (Proven.) by OSHA. Classified A2 (Suspected for human.) by ACGIH. **MUTAGENIC EFFECTS:** Not available. **TERATOGENIC EFFECTS:** Not available. **DEVELOPMENTAL TOXICITY:** Not available. The substance may be toxic to kidneys, lungs, heart, cardiovascular system, upper respiratory tract, eyes, teeth. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged



contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

## Section 4: First Aid Measures

### Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

### Skin Contact:

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

### Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

### Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

### Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. **WARNING:** It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

### Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

**Serious Ingestion:** Not available.

## Section 5: Fire and Explosion Data

**Flammability of the Product:** Non-flammable.

**Auto-Ignition Temperature:** Not applicable.

**Flash Points:** Not applicable.

**Flammable Limits:** Not applicable.

### Products of Combustion:

Products of combustion are not available since material is non-flammable. However, products of decomposition include fumes of oxides of sulfur. Will react with water or steam to produce toxic and corrosive fumes. Reacts with carbonates to generate carbon dioxide gas. Reacts with cyanides and sulfides to form poisonous hydrogen cyanide and hydrogen sulfide respectively.

**Fire Hazards in Presence of Various Substances:** Combustible materials

### Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. Slightly explosive in presence of oxidizing materials.

**Fire Fighting Media and Instructions:** Not applicable.

### Special Remarks on Fire Hazards:

Metal acetylides (Monocesium and Monorubidium), and carbides ignite with concentrated sulfuric acid. White Phosphorous + boiling Sulfuric acid or its vapor ignites on contact. May ignite other combustible materials. May cause fire when sulfuric acid is mixed with Cyclopentadiene, cyclopentanone oxime, nitroaryl amines, hexalithium disilicide, phosphorous (III) oxide, and oxidizing agents such as chlorates, halogens, permanganates.

**Special Remarks on Explosion Hazards:**

Mixtures of sulfuric acid and any of the following can explode: p-nitrotoluene, pentasilver trihydroxydiaminophosphate, perchlorates, alcohols with strong hydrogen peroxide, ammonium tetraperoxychromate, mercuric nitrite, potassium chlorate, potassium permanganate with potassium chloride, carbides, nitro compounds, nitrates, carbides, phosphorous, iodides, picrates, fulminates, dienes, alcohols (when heated) Nitramide decomposes explosively on contact with concentrated sulfuric acid. 1,3,5-Trinitrosohexahydro-1,3,5-triazine + sulfuric acid causes explosive decomposition.

**Section 6: Accidental Release Measures****Small Spill:**

Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: Neutralize the residue with a dilute solution of sodium carbonate.

**Large Spill:**

Corrosive liquid. Poisonous liquid. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of sodium carbonate. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

**Section 7: Handling and Storage****Precautions:**

Keep locked up.. Keep container dry. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, reducing agents, combustible materials, organic materials, metals, acids, alkalis, moisture. May corrode metallic surfaces. Store in a metallic or coated fiberboard drum using a strong polyethylene inner package.

**Storage:**

Hygroscopic. Reacts violently with water. Keep container tightly closed. Keep container in a cool, well-ventilated area. Do not store above 23°C (73.4°F).

**Section 8: Exposure Controls/Personal Protection****Engineering Controls:**

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

**Personal Protection:**

Face shield. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves. Boots.

**Personal Protection in Case of a Large Spill:**

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

**Exposure Limits:**

TWA: 1 STEL: 3 (mg/m<sup>3</sup>) [Australia] Inhalation TWA: 1 (mg/m<sup>3</sup>) from OSHA (PEL) [United States] Inhalation TWA: 1 STEL: 3 (mg/m<sup>3</sup>) from ACGIH (TLV) [United States] [1999] Inhalation TWA: 1 (mg/m<sup>3</sup>) from NIOSH [United States] Inhalation TWA: 1 (mg/m<sup>3</sup>) [United Kingdom (UK)] Consult local authorities for acceptable exposure limits.

**Section 9: Physical and Chemical Properties**

**Physical state and appearance:** Liquid. (Thick oily liquid.)

**Odor:** Odorless, but has a choking odor when hot.

**Taste:** Marked acid taste. (Strong.)

**Molecular Weight:** 98.08 g/mole

**Color:** Colorless.

**pH (1% soln/water):** Acidic.

**Boiling Point:**

270°C (518°F) - 340 deg. C Decomposes at 340 deg. C

**Melting Point:** -35°C (-31°F) to 10.36 deg. C (93% to 100% purity)

**Critical Temperature:** Not available.

**Specific Gravity:** 1.84 (Water = 1)

**Vapor Pressure:** Not available.

**Vapor Density:** 3.4 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** See solubility in water.

**Solubility:**

Easily soluble in cold water. Sulfuric is soluble in water with liberation of much heat. Soluble in ethyl alcohol.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:**

Conditions to Avoid: Incompatible materials, excess heat, combustible material materials, organic materials, exposure to moist air or water, oxidizers, amines, bases. Always add the acid to water, never the reverse.

**Incompatibility with various substances:**

Reactive with oxidizing agents, reducing agents, combustible materials, organic materials, metals, acids, alkalis, moisture.

**Corrosivity:**

Extremely corrosive in presence of aluminum, of copper, of stainless steel(316). Highly corrosive in presence of stainless steel(304). Non-corrosive in presence of glass.

**Special Remarks on Reactivity:**

Hygroscopic. Strong oxidizer. Reacts violently with water and alcohol especially when water is added to the product. Incompatible (can react explosively or dangerously) with the following: ACETIC ACID, ACRYLIC ACID, AMMONIUM HYDROXIDE, CRESOL, CUMENE, DICHLOROETHYL ETHER, ETHYLENE CYANOHYDRIN, ETHYLENEIMINE, NITRIC ACID, 2-NITROPROPANE, PROPYLENE OXIDE, SULFOLANE, VINYLIDENE CHLORIDE, DIETHYLENE GLYCOL MONOMETHYL ETHER, ETHYL ACETATE, ETHYLENE CYANOHYDRIN, ETHYLENE GLYCOL MONOETHYL ETHER ACETATE, GLYOXAL, METHYL ETHYL KETONE, dehydrating agents, organic materials, moisture (water), Acetic anhydride, Acetone, cyanohydrin, Acetone+nitric acid, Acetone + potassium dichromate, Acetonitrile, Acrolein, Acrylonitrile, Acrylonitrile +water, Alcohols + hydrogen peroxide, ally compounds such as Allyl alcohol, and Allyl Chloride, 2-Aminoethanol, Ammonium hydroxide, Ammonium triperchromate, Aniline, Bromate + metals, Bromine pentafluoride, n-Butyraldehyde, Carbides, Cesium acetylene carbide, Chlorates, Cyclopentanone oxime, chlorinates, Chlorates + metals, Chlorine trifluoride, Chlorosulfonic acid, 2-cyano-4-nitrobenzenediazonium hydrogen sulfate, Cuprous nitride, p-chloronitrobenzene, 1,5-Dinitronaphthlene +

sulfur, Diisobutylene, p-dimethylaminobenzaldehyde, 1,3-Diazidobenzene, Dimethylbenzylcarbinol + hydrogen peroxide, Epichlorohydrin, Ethyl alcohol + hydrogen peroxide, Ethylene diamine, Ethylene glycol and other glycols, , Ethylenimine, Fulminates, hydrogen peroxide, Hydrochloric acid, Hydrofluoric acid, Iodine heptafluoride, Indane + nitric acid, Iron, Isoprene, Lithium silicide, Mercuric nitride, Mesityl oxide, Mercury nitride, Metals (powdered), Nitromethane, Nitric acid + glycerides, p-Nitrotoluene, Pentasilver trihydroxydiaminophosphate, Perchlorates, Perchloric acid, Permanganates + benzene, 1-Phenyl-2-methylpropyl alcohol + hydrogen peroxide, Phosphorus, Phosphorus isocyanate, Picrates, Potassium tert-butoxide, Potassium chlorate, Potassium Permanganate and other permanganates, halogens, amines, Potassium Permanganate + Potassium chloride, Potassium Permanganate + water, Propiolactone (beta)-, Pyridine, Rubidium acetylethylene carbide, Silver permanganate, Sodium, Sodium carbonate, sodium hydroxide, Steel, styrene monomer, toluene + nitric acid, Vinyl acetate, Thallium (I) azidodithiocarbonate, Zinc chlorate, Zinc Iodide, azides, carbonates, cyanides, sulfides, sulfites, alkali hydrides, carboxylic acid anhydrides, nitriles, olefinic organics, aqueous acids, cyclopentadiene, cyano-alcohols, metal acetylides, Hydrogen gas is generated by the action of the acid on most metals (i.e. lead, copper, tin, zinc, aluminum, etc.). Concentrated sulfuric acid oxidizes, dehydrates, or sulfonates most organic compounds.

#### **Special Remarks on Corrosivity:**

Non-corrosive to lead and mild steel, but dilute acid attacks most metals. Attacks many metals releasing hydrogen. Minor corrosive effect on bronze. No corrosion data on brass or zinc.

**Polymerization:** Will not occur.

## **Section 11: Toxicological Information**

**Routes of Entry:** Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

#### **Toxicity to Animals:**

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 2140 mg/kg [Rat.]. Acute toxicity of the vapor (LC50): 320 mg/m<sup>3</sup> 2 hours [Mouse].

#### **Chronic Effects on Humans:**

CARCINOGENIC EFFECTS: Classified 1 (Proven for human.) by IARC, + (Proven.) by OSHA. Classified A2 (Suspected for human.) by ACGIH. May cause damage to the following organs: kidneys, lungs, heart, cardiovascular system, upper respiratory tract, eyes, teeth.

#### **Other Toxic Effects on Humans:**

Extremely hazardous in case of inhalation (lung corrosive). Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (corrosive), of ingestion, .

**Special Remarks on Toxicity to Animals:** Not available.

#### **Special Remarks on Chronic Effects on Humans:**

Mutagenicity: Cytogenetic Analysis: Hamster, ovary = 4mmol/L Reproductive effects: May cause adverse reproductive effects based on animal data. Developmental abnormalities (musculoskeletal) in rabbits at a dose of 20 mg/m<sup>3</sup> for 7 hrs.(RTECS) Teratogenicity: neither embryotoxic, fetotoxic, nor teratogenic in mice or rabbits at inhaled doses producing some maternal toxicity

#### **Special Remarks on other Toxic Effects on Humans:**

Acute Potential Health Effects: Skin: Causes severe skin irritation and burns. Continued contact can cause tissue necrosis. Eye: Causes severe eye irritation and burns. May cause irreversible eye injury. Ingestion: Harmful if swallowed. May cause permanent damage to the digestive tract. Causes gastrointestinal tract burns. May cause perforation of the stomach, GI bleeding, edema of the glottis, necrosis and scarring, and sudden circulatory collapse(similar to acute inhalation). It may also cause systemic toxicity with acidosis. Inhalation: May cause severe irritation of the respiratory tract and mucous membranes with sore throat, coughing, shortness of breath, and delayed lung edema. Causes chemical burns to the respiratory tract. Inhalation may be fatal as a result of spasm, inflammation, edema of the larynx and bronchi, chemical pneumonitis, and pulmonary edema. Cause corrosive action on mucous membranes. May affect cardiovascular system (hypotension, depressed cardiac output, bradycardia). Circulatory collapse with clammy skin, weak and rapid pulse, shallow respiration, and scanty urine may follow. Circulatory shock is often the immediate cause of death. May also affect teeth(changes in teeth and supporting structures - erosion, discoloration). Chronic Potential Health Effects: Inhalation: Prolonged or repeated inhalation may affect behavior (muscle contraction or spasticity), urinary system (kidney damage), and cardiovascular system, heart (ischemic heart lesions), and respiratory system/lungs(pulmonary edema, lung damage), teeth (dental discoloration, erosion). Skin: Prolonged or repeated skin contact may cause dermatitis, an allergic skin reaction.

## Section 12: Ecological Information

**Ecotoxicity:** Ecotoxicity in water (LC50): 49 mg/l 48 hours [bluegill/sunfish].

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The products of degradation are less toxic than the product itself.

**Special Remarks on the Products of Biodegradation:** Not available.

## Section 13: Disposal Considerations

**Waste Disposal:**

Sulfuric acid may be placed in sealed container or absorbed in vermiculite, dry sand, earth, or a similar material. It may also be diluted and neutralized. Be sure to consult with local or regional authorities (waste regulators) prior to any disposal. Waste must be disposed of in accordance with federal, state and local environmental control regulations.

## Section 14: Transport Information

**DOT Classification:** Class 8: Corrosive material

**Identification:** : Sulfuric acid UNNA: 1830 PG: II

**Special Provisions for Transport:** Not available.

## Section 15: Other Regulatory Information

**Federal and State Regulations:**

Illinois toxic substances disclosure to employee act: Sulfuric acid New York release reporting list: Sulfuric acid Rhode Island RTK hazardous substances: Sulfuric acid Pennsylvania RTK: Sulfuric acid Minnesota: Sulfuric acid Massachusetts RTK: Sulfuric acid New Jersey: Sulfuric acid California Director's List of Hazardous Substances (8 CCR 339): Sulfuric acid Tennessee RTK: Sulfuric acid TSCA 8(b) inventory: Sulfuric acid SARA 302/304/311/312 extremely hazardous substances: Sulfuric acid SARA 313 toxic chemical notification and release reporting: Sulfuric acid CERCLA: Hazardous substances.: Sulfuric acid: 1000 lbs. (453.6 kg)

**Other Regulations:**

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

**Other Classifications:**

**WHMIS (Canada):**

CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS E: Corrosive liquid.

**DSCL (EEC):**

R35- Causes severe burns. S2- Keep out of the reach of children. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S30- Never add water to this product. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

**HMIS (U.S.A.):**

**Health Hazard:** 3

**Fire Hazard:** 0

**Reactivity:** 2

**Personal Protection:****National Fire Protection Association (U.S.A.):****Health:** 3**Flammability:** 0**Reactivity:** 2**Specific hazard:****Protective Equipment:**

Gloves. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Face shield.

**Section 16: Other Information****References:**

-Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II. -Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987.

**Other Special Considerations:** Not available.**Created:** 10/09/2005 11:58 PM**Last Updated:** 11/06/2008 12:00 PM

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## **ATTACHMENT C**

### **SAFETY PROCEDURES/FIELD OPERATING PROCEDURES (FLD OPS)**

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Insert documents on following page.



## FLD 02 INCLEMENT WEATHER

Hot weather (ambient temperatures over 70°F), cold weather (ambient temperatures below 40°F), rain, snow, ice, and lightning are examples of inclement weather that may be hazardous or add risk to work activities. Extremes of heat, cold, and humidity, as well as rain, snow, and ice, can adversely affect monitoring instrument response and reliability, respiratory protection performance, and chemical protective clothing materials.

### RELATED FLDs AND OP

*FLD 05 – Heat Stress Prevention and Monitoring*

*FLD 06 – Cold Stress*

*OP 05-03-008 – Inclement Weather & Business Disruption Policy*

### PROCEDURE

The potential for exacerbating the impact of physical hazards must be considered for tasks that expose personnel to inclement weather. Risk assessment and hazards analysis should be accomplished during the planning stages of a project for the most likely inclement weather conditions that may be encountered, i.e., rain and lightning in late spring, summer, and early fall, or lightning prone areas; cold, snow, and ice in winter. The Field Safety Officer (FSO) must determine the proper safety procedures and recommend them to the site manager. Each worker must evaluate the risk associated with his/her work and be actively alert to these hazards. Managers and workers must be familiar with the requirements of FLD 05 and FLD 06.

A pre-site activity risk assessment must be completed when inclement weather occurs. Weather conditions that affect instruments and personal protective equipment (PPE) function must be conveyed to site workers who should monitor function and integrity of PPE and be alert to changing weather conditions. A decision must be made on the proper safety procedures to use if work must continue, or to stop work if the risk is too great. The appropriate Safety Professional **must be notified of all instances of the need to stop work for safety reasons, including inclement weather.**

### Heat

Hot, dry weather increases risk of soil drying, erosion, and dust dispersion, which may present or increase risk of exposure and environmental impact from toxic hazards. Hot weather will increase pressure on closed containers and the rate of volatilization, thereby potentially increasing the risk of exposure to toxic, flammable, or explosive atmospheres.

### Prevention and Protective Measures

Employees must be protected from airborne contaminants using engineering controls such as wetting dry soil to prevent particle dispersion, and providing local ventilation to reduce volatile air contaminants to safe levels, or if engineering controls are infeasible, using prescribed PPE. Wind shifts and velocity should be measured where change may result in dispersion of airborne contaminants into the work area.

### Rain, Wet Weather, and High Humidity

Wet conditions resulting from rain and wet weather increase slipping and tripping hazards, braking distances of vehicles, the potential for vehicle skidding, or difficulties in handling powered devices such as augers and drills. Rain fills holes, obscures trip and fall hazards, and increases risk of electrical shock

when working with electrical equipment. Changes in soil conditions caused by rain can impact trenching and excavating activities, creating the potential for quicksand formation, wall collapse, and cave-in. Vehicles become stuck in mud, and tools and personnel can slip on wet surfaces. Rain and wet conditions may decrease visibility (especially for personnel wearing respiratory protection) and limit the effectiveness of certain direct-reading instruments (e.g., photoionization detectors [PIDs]).

Feet that become wet and are allowed to remain wet can lead to serious problems under both heat and cold conditions. Activities that may result in wet feet include extended work in chemical protective clothing and wading in water/liquid during biological assessments. Trench foot, paddy foot, and immersion foot are terms associated with foot ailments resulting from feet being wet for long periods of time. All have similar symptoms and effects. Initial symptoms include edema (swelling), tingling, itching, and severe pain. These may be followed by more severe symptoms including blistering, death of skin tissue, and ulceration. (NOTE: The following Preventive and Protective Measures also apply to Cold, Snow, and Ice.)

### Preventive and Protective Measures

Walkways, stairs, ladders, elevated workplaces, and scaffold platforms must be kept free of mud, ice, and snow. Employees shall be prohibited from working on scaffolds covered with snow, ice, or other slippery material except as necessary for removal of such materials.

Vehicles used in rain or cold weather must have working windshield wipers and defrosters, and windows must be kept clear of obstruction.

Drivers must observe traffic laws, including maintaining speed within limits safe for weather conditions, and wearing seat belts at all times. Note that this may mean operating below the posted speed limit.

When walking, workers should use a walking stick or probe to test footing ahead where there is standing water, snow, or ice to protect the walker against stepping into potholes or onto puncture hazards, buried containers, or other potential structurally unsound surfaces.

Prior to using vehicles or equipment in off-road work, workers should walk the work area or intended travelway when puddles or snow may obscure potholes, puncture hazards, or buried containers, or other potential structurally unsound surfaces.

Project managers should arrange to have winches, come-alongs, or other mechanical assistance available when vehicles are used in areas where there is increased risk of getting stuck. Cable or rope and mechanical equipment used for pulling stuck vehicles must be designed for the purpose, of sufficient capacity for the load, and be inspected regularly and before use to ensure safety. **Manually pushing stuck vehicles is to be avoided.**

Prevention methods are required when work is performed in wet conditions or when conditions result in sweating, causing the feet to become and remain wet. Proper hygiene is critical. Workers must dry their feet and change socks regularly to avoid conditions associated with wet feet. Use of foot talc or powder can additionally assist in prevention of this type of condition.

### **Cold, Snow, and Ice**

Cold weather affects vehicle operation by increasing difficulty in starting and braking. Ice, frost, and snow can accumulate on windows and reduce vision. Cold, wet weather can cause icing of roadways,

driveways, parking areas, general work places, ladders, stairs, and platforms. Ice is not always as obvious to see as snow or rain, and requires special attention, especially when driving or walking.

Snow and ice increase the risk of accidents such as slipping when walking, climbing steps and ladders, or working at elevation, and the risk of accidents when driving vehicles or operating heavy equipment. Heavy snow and ice storms may cause electric lines to sag or break, and the use of electrical equipment in snow increases the risk of electric shock. Snow can hide potholes and mud, which can result in vehicles getting stuck or persons falling when stepping into hidden holes. Snow also may cover water, drums or other containers, sharp metal objects, debris, or other objects that can cause falls or punctures.

### Preventive and Protective Measures

WESTON personnel are cautioned against operating motor vehicles such as cars or trucks on ice under any circumstances. If traveling in icy conditions, WESTON personnel should follow all public service advisories that curtail driving activities.

Personnel performing activities that require working over ice should be aware of minimal ice thickness safety guidelines as follows:

- 4-inch minimum: activities such as walking or skating.
- 6-inch minimum: activities such as snowmobiling or the use of equipment with the same weight and cross-sectional area as a snowmobile.

Personnel should always be aware that these measurement guidelines are under ideal conditions and that snow cover, conditions on rivers, ponds, or lakes with active currents, and other environmental factors impact the safety of working on ice. Clear ice typically is the strongest, while ice that appears cloudy or honeycombed (contains entrained air) is not as structurally strong. Measurements made by drilling or cutting through the ice should be made every few feet to verify safe conditions. Provisions for rescue (e.g., ladders or long poles and effective communications) must be available at the work site.

## **Lightning**

Lightning represents a hazard of electrical shock that is increased when working in flat open spaces, elevated work places, or near tall structures or equipment such as stacks, radio towers, and drill rigs. Lightning has caused chemical storage tank fires and grass or forest fires. Static charges associated with nearby electrical storms can increase risk of fire or explosion when working around flammable materials, and can adversely affect monitoring instruments.

Lightning is the most dangerous and frequently encountered weather hazard people experience each year. Lightning affects all regions. **Florida, Michigan, Pennsylvania, North Carolina, New York, Ohio, Texas, Tennessee, Georgia, and Colorado** have the most lightning deaths and injuries.

### Preventive and Protective Measures

Prior to working in areas or beginning projects when or where there is an increased potential for lightning striking personnel, steps must be taken to predict the occurrence of lightning strikes. Recommendations include:

- Check with client management to determine if there are any patterns or noted conditions that can help predict lightning or if there are structures that are prone to lightning strikes. Arrange for

client notification when there is increased potential for lightning activities. Ensure that clients include WESTON workers in lightning contingency plans.

- Monitor weather reports.
- Note weather changes and conditions that produce lightning.
- Stop work in open areas, around drill rigs or other structures that may attract lightning, on or in water and in elevated work places when lightning strikes are sighted or thunder is heard near a work site.
- Ensure all personnel are provided with safe areas of refuge. Prevent personnel from standing in open areas, under lone trees, or under drill rigs.
- Observe the “30-30” Rule. If you see lightning and thunder is heard within 30 seconds (approximately 6 miles), seek shelter. If you hear thunder, but did not see the lightning, you can assume that lightning is within 6 miles and you should seek shelter. Remain in the sheltered location for 30 minutes following the last lightning strike.
- Use a hand held static potential meter (lightning detection device) to monitor the potential difference between a cloud and the ground. When the measured potential is greater than 2 kV/m, there is a potential for a lightning strike – seek shelter.

## **High Wind and Tornado Safety**

### High Winds

Many construction workers have died due to wind-related accidents and injuries. A ladder that seems secure under normal circumstances can become unstable during windy conditions and cause you to fall. Scaffolding that is improperly secured can rip free during strong winds and kill bystanders. The risk of injury for construction workers increases during strong winds. Keep in mind that changing weather conditions can affect your daily work tasks, and make sure you have a game plan to prevent proper damage and personal injury.

Stay Informed: With today’s modern technology available at the touch of a button, you should keep up to date with the latest local weather reports. Visit [weatherbug.com](http://weatherbug.com) or [weather.gov](http://weather.gov) to stay informed in case of wind warnings, watches, and advisories. Larger projects may have their own weather station on site to provide instant weather data. Use daily hazard assessments to determine if working conditions have changed or will change throughout the day.

Be Prepared: When you know the weather will be windy, secure loose building materials, scaffolding and fencing that could be picked up or torn loose by strong winds and thrown onto surrounding streets, structures, vehicles, or bystanders.

Know the Limits of Your Equipment: When operating any equipment, take time to read the operator’s manual and become familiar with the wind specifications. Many crane manufacturers have high-wind guidelines to prevent you from operating a crane in unsafe weather. You should also check safety equipment such as fall protection to determine if it is adequate for windy conditions.

## Know the Terminology

### Severe Thunderstorm Watch

A Severe Thunderstorm Watch means that strong thunderstorms capable of producing winds of 58 mph or higher and/or hail 3/4 inches in diameter or larger are possible. If you are in the area of a Severe Thunderstorm Watch, you should be prepared to take shelter from thunderstorms. Severe Thunderstorm Watches are generally issued for 6-hour periods.

### Severe Thunderstorm Warning

A Severe Thunderstorm Warning means that thunderstorms capable of strong winds and/or large hail are occurring or could form at any time. If you are in the area of a severe thunderstorm, you should take shelter indoors immediately, avoid windows, and be prepared for high winds and hail. Severe Thunderstorm Warnings are generally in effect for an hour or less.

### High Wind Watch

A High Wind Watch is issued when sustained winds exceeding 40 mph and/or frequent gusts over 60 mph are likely to develop in the next 24 to 48 hours. For summit areas, high wind watches are issued when sustained winds are expected to exceed 45 mph and/or frequently gust over 60 mph. If you are in an area for which a High Wind Watch has been issued you should secure loose objects outdoors that may blow about and avoid outdoor activity that exposes you to high winds.

### High Wind Warning

A High Wind Warning is issued when sustained winds exceeding 40 mph and/or frequent gusts over 60 mph are occurring or imminent. For summit areas, warnings are issued for winds exceeding 45 mph and/or frequently gusting over 60 mph. Wind warnings may issued up to 24 hours ahead of the onset of high winds and remain in effect for 6 to 12 hours. If you are in an area where a high wind warning is in effect you should avoid activities that expose you to high winds. Loose objects may be blown around. Tree limbs may break and fall. Power lines may be blown down.

### Wind Advisory

A Wind Advisory is issued when sustained winds of 30 to 39 mph and/or frequent gusts to 50 mph or greater are occurring or imminent. Wind advisories may be in effect for 6 to 12 hours. If you are in an area where a wind advisory is in effect you should secure loose objects that may be blown about outdoors and limit activity that may expose you to high winds.

Work Safely: If you will be working on a windy day, you should be alert and protected. Wear eye protection to prevent dust and other particles from entering or striking your eyes. Keep your hard hat on at all times to prevent injuries from falling or flying objects. The likelihood of falls from heights is greatly increased by strong winds. Wear the necessary PPE to ensure your safety.

To avoid flying debris and to minimize damage during high winds:

- Shut down outdoor activities involving work at elevation on ladders, scaffolding, aerial lifts, etc.; handling large tarps and plastic sheeting when wind speeds exceed 25 mph; including work with radioactive materials and highly toxic materials that could be dispersed by the winds.
- At 13 - 18 mph wind will raise dust. Follow the dust action level.

- Move mobile items stored outside to indoor storage.
- Secure any items that cannot be moved inside.
- Be careful opening exterior doors.
- Be cautious about downed power lines, tree limbs, and debris on roads.
- Be alert for animals who have escaped from farms and zoos.

Stay Away from Power Lines: High winds can cause tree limbs to fall on power lines resulting in electrocution hazards or loss of power. Your best bet is to keep your distance.

## Tornados

### What is a TORNADO?

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud. It is spawned by a thunderstorm or as a result of severe weather associated with hurricanes. A funnel cloud is formed as cool air overrides a layer of warm air, forcing the warm air to rise rapidly. The damage from a tornado results from high wind velocity and wind blown debris.

### Tornado Safety

When a tornado approaches, you have only a brief amount of time to make life-or-death decisions. Advance planning and quick response are the keys to surviving a tornado.

Purchase a NOAA Weather Alert radio with an alert feature. When tuned to the proper frequency, these weather radios remain silent until a weather emergency occurs. Once they pick up the alarm tone, they will begin broadcasting emergency weather information so that citizens can protect themselves and their property. Some models of the NOAA weather radio incorporate the Specific Area Message Encoder technology, allowing users to target only those warnings that affect their immediate geographic area.

Conduct tornado drills. Designate an area to serve as your safe area, and practice having team members assemble there in response to a mock tornado warning.

Emergency Communications Plan. Develop an emergency communications plan in case team members are separated from one another when a tornado warning goes into effect. Designate an emergency coordinator. Instruct everyone to contact this coordinator in a weather emergency for instructions on what to do during the storm and where to reassemble after the emergency has passed. Design contingency plans to be consistent with client contingency plans. When possible use client warning and alerting systems and confirm that team members have access to shelters and know how to get to them.

### Know the Difference between a Tornado Watch and a Tornado Warning

Tornado Watch: Issued by the National Weather Service when tornadoes are possible in your area. You should remain alert for approaching storms. Remind family members of where the safe areas are within your home, and carefully monitor radio or television reports for further developments.

Tornado Warning: Indicates that a tornado has been sighted in your area, or is indicated on weather radar. You should proceed to safe shelter immediately.

*When A Tornado Warning Goes In Effect, Put Your Safety Plans In Action.*

**In Your Automobile:** Motor vehicles are easily overturned by tornado winds. Leave your vehicle and seek shelter in a sturdy building. As a last resort, seek shelter in a ditch or culvert. Do not try to outrun or outmaneuver a tornado! Use the time to seek appropriate shelter outside your vehicle.

**Office Buildings, Hotels, and Shopping Centers:** Take shelter in an interior hallway on a lower floor. A closet, bathroom or other small room with short, stout walls will give some protection from collapse and flying debris. Otherwise, get under heavy furniture and stay away from windows. Many tornado deaths have occurred in large buildings due to the collapse of a roof or wide span wall. A corner area, away from a window, is safer than the middle of a wide span wall.

**Out In Open Country:** When severe weather approaches, seek inside shelter immediately. The chances of encountering falling trees, downed power lines and lightning are far greater than encountering a tornado itself. If a tornado approaches, lie flat in the nearest depression, such as a culvert or ditch, and cover your head with your arms.

**BE ALERT TO CHANGING WEATHER CONDITIONS**

**HAVE AN EMERGENCY WEATHER PLAN IN PLACE**

**REHEARSE YOUR CONTINGENCY PLANS PERIODICALLY**

**KNOW WHERE TO GO WHEN A TORNADO THREATENS.**

## **FLD 05 HEAT STRESS PREVENTION AND MONITORING**

Heat stress may occur at any time work is performed at elevated temperatures. If the body's physiological processes fail to maintain a normal body temperature because of excessive heat, a number of physical reactions can occur such as fatigue, irritability, anxiety, and decreased concentration or dexterity, and possibly death. Because heat stress is one of the most common and potentially serious illnesses at field sites, regular monitoring and other preventive measures are vital to ensure worker safety. Wearing chemical protective clothing often decreases natural body heat loss (cooling) and increases the risk of heat stress.

Employees who are taking prescription or over-the-counter medications should consult with their personal physician prior to working in high-temperature environments to see if their medication would impair their ability to handle heat stress.

### **REFERENCES**

OSHA 29 CFR 1910 and 1926

### **RELATED FLDs**

*FLD 02 – Inclement Weather*

*FLD 03 – Hot Processes – Steam, Low Temperature Thermal Treatment Unit, and Transportable Incinerator*

*FLD 08 – Confined Space Entry Program*

*FLD 36 – Welding/Cutting/Burning*

*FLD 37 – Pressure Washers/Sandblasting*

### **PROCEDURE**

#### **Heat Stress Symptoms and Treatment**

##### Heat Rash

Heat rash, also known as prickly heat, may occur in hot and humid environments where sweat is not easily removed from the surface of the skin by evaporation and is aggravated by chafing clothes. When extensive or complicated by infection, heat rash can be so uncomfortable that it inhibits sleep and impairs a worker's performance.

Symptoms – Mild red rash, especially in areas of the body that come into contact with protective gear.

Treatment – Decrease amount of time spent working in protective gear and provide body powder to help absorb moisture and decrease chafing. Heat rash can be prevented by showering, resting in a cool place, and allowing the skin to dry.

##### Heat Cramps

Heat cramps are caused by inadequate electrolyte intake. The individual may be receiving adequate water; however, if not combined with an adequate supply of electrolytes, the blood can thin to the point where it seeps into the active muscle tissue, causing cramping.

Symptoms – Acute painful spasms of voluntary muscles, most notably the abdomen and extremities.



*Treatment* – Move the victim to a cool area and loosen clothing. Have the victim drink 1 to 2 cups of lightly salted water or diluted commercial electrolyte solution (e.g., Gatorade, Quench) immediately, and then every 20 minutes thereafter until symptoms subside. Electrolyte supplements can enhance recovery however, it is best to double the amount of water required by the dry mix package directions or add water to the liquid form.

### Heat Exhaustion

Heat exhaustion is a state of weakness or exhaustion caused by the loss of fluids from the body. The condition is much less dangerous than heat stroke, but it nonetheless must be treated.

*Symptoms* – Pale, clammy, and moist skin, profuse perspiring, and extreme weakness. Body temperature is normal, pulse is weak and rapid, and breathing is shallow. The person may have a headache, may vomit, may feel dizzy, and may be irritable or confused.

*Treatment* – Move the victim to a cool, air-conditioned or temperature-controlled area, loosen clothing, place in a position with the head lower than the feet (shock prevention), and allow the victim to rest. Consult a physician. Have the victim drink 1 to 2 cups of water immediately, and every 20 minutes thereafter until symptoms subside. Seek medical attention at the advice of the consulting physician.

### Heat Stroke

Heat stroke is an acute and dangerous reaction to heat stress caused by a failure of the body's heat regulating mechanisms (i.e., the individual's temperature control system [sweating] stops working correctly). Body temperature rises so high that brain damage and death may result if the person is not cooled quickly.

*Symptoms* – Red, hot, dry skin (although the person may have been sweating earlier); nausea, dizziness, confusion, extremely high body temperature, rapid respiratory and pulse rate, seizures or convulsions, unconsciousness or coma.

*Treatment* – Immediately call for emergency medical assistance. Remove the victim from the source of heat and cool the victim quickly. If the body temperature is not brought down quickly, permanent brain damage or death may result. Soak the victim in cool (not cold) water, sponge the body with cool water, or pour water on the body to reduce the temperature to a safe level (less than 102°F). Monitor the victim's vital signs. If possible, have the victim drink cool water. Do not give the victim coffee, tea, or alcoholic beverages.

## **Recognition and Risk Assessment**

In the planning stages of a project, the potential for heat stress disorders must be considered as a physical hazard in the site-specific Health and Safety Plan (HASP). Risk assessment can be accomplished in the development stages of a project by listing in the HASP the most likely heat stress disorders that may occur. The Field Safety Officer (FSO) must make decisions on the proper safety procedures and recommend them to the site manager. Each worker must evaluate the risk associated with his or her work and be actively alert to these hazards. Any site worker may stop work if safety procedures are not followed or the risk is too great. In addition, all site personnel must be aware of these symptoms in both themselves and their co-workers.

## **Prevention and Protection Programs**

Heat stress is affected by several interacting factors including, but not limited to, age, obesity, physical condition, substance abuse, level of personal protective equipment (PPE) worn, and environmental conditions (temperature, shade, and humidity). Site workers must learn to recognize and treat the various forms of heat stress. The following recommendations should be followed to prevent heat stress:

- The most important measure to prevent heat-related illness is adequate fluid intake. Workers should drink 1/2 to 1 quarts of liquids per hour in high heat conditions. Most of this liquid should be water. Under heavy work and heat conditions, the body may lose up to 2 gallons of fluids per day. To prevent heat stress symptoms, the individual must ensure replacement of this fluid.
- Provide disposable cups that hold about 4 ounces, and water that is maintained at 50 to 60°F. Workers should drink 16 ounces of water before beginning work, and a cup or two at each break period.
- Provide a shaded area for rest breaks. Ensure that adequate shelter is available to protect personnel against heat and direct sunlight. When possible, shade the work area.
- Discourage the intake of caffeinated drinks during working hours.
- Monitor for signs of heat stress.
- Encourage workers to maintain a good diet during these periods. In most cases, a balanced diet and lightly salted foods should help maintain the body's electrolyte balance. Bananas are especially good for maintaining the body's potassium level.
- If utilizing commercial electrolyte mixes, double the amount of water called for in the package directions. Indications are that "full-strength" preparations taken under high heat stress conditions may actually decrease the body's electrolytes.
- Acclimate workers to site work conditions by slowly increasing workloads (i.e., do not begin work activities with extremely demanding tasks).
- Rotate shifts of workers who are required to wear impervious clothing in hot weather.
- Encourage workers to wear lightweight, light-colored, loose-fitting clothing.
- In extremely hot weather, conduct field activities in the early morning and evening.
- Provide cooling devices to aid natural body heat regulation. These devices, however, add weight and their use should be balanced against worker efficiency. An example of a cooling aid is long cotton underwear, which acts as a wick to absorb moisture and protect the skin from direct contact with heat-absorbing protective clothing.
- Good hygienic standards must be maintained by frequent showering and changes of clothing.
- Clothing should be permitted to dry during rest periods.
- Whenever working in the sun, provide employees with sunscreen with both UVA and UVB protection.
- Persons who notice skin problems should immediately consult medical personnel.

## **Heat Stress Monitoring and Work Cycle Management**

When strenuous field activities are part of on-going site work conducted in hot weather, the following guidelines should be used to monitor the body's physiological response to heat, and to manage the work cycle, even if workers are not wearing impervious clothing. These procedures should be instituted when the temperature exceeds 70°F and the tasks/risk analysis indicates an increased risk of heat stress

problems. Consult the HASP and a safety professional (e.g., Division EHS Manager, FSO) if questions arise as to the need for specific heat stress monitoring. In all cases, the site personnel must be aware of the signs and symptoms of heat stress and provide adequate rest breaks and proper aid as necessary.

**Measure Heart Rate** – Heart rate should be measured by the radial pulse for 30 seconds as early as possible in the rest period. The heart rate at the beginning of the rest period should not exceed 110 beats per minute. If the heart rate is higher, the next work period should be shortened by 33%, while the length of the rest period stays the same. If the pulse rate still exceeds 110 beats per minute at the beginning of the next rest period, the following work cycle should be further shortened by 33%. The procedure is continued until the rate is maintained below 110 beats per minute.

**Measure Body Temperature** – When ambient temperatures are over 90°F, body temperatures should be measured with a clinical thermometer as early as possible in the rest period. If the oral temperature exceeds 99.6°F (or 1 degree change from baseline) at the beginning of the rest period, the following work cycle should be shortened by 33%. The procedure is continued until the body temperature is maintained below 99.6°F (or 1 degree change from baseline). Under no circumstances should a worker be allowed to work if their oral temperature exceeds 100.6°F.

**Measure Body Water Loss** – Body water loss greater than 1.5% of total body weight is indicative of a heat stress condition. Body weight is measured before PPE is donned and after the PPE is removed following a work cycle. Body water loss can be measured with an ordinary bathroom scale; however, the scale must be sensitive to one-half pounds increments. A worker is required to drink additional fluids and rest if their body water loss is greater than 1.5%.

**NOTE:** For purposes of this operating practice, a break is defined as a 15-minute period and/or until an individual's vital signs are within prescribed guidelines.

A physiological monitoring schedule is determined by following the steps below:

- Measure the air temperature with a standard thermometer.
- Estimate the fraction of sunshine by judging what percent the sun is out (refer to Table 1).
- Calculate the adjusted temperature based on the following formula:  
$$\text{Adjusted Temperature} = \text{Actual Temperature} + 13 \times X \text{ (where } X = \text{sunshine fraction from Table 1)}$$
- Using Table 2, determine the physiological monitoring schedule for fit and acclimated workers for the calculated adjusted temperature.

The length of work period is governed by frequency of physiological monitoring (Table 2). The length of the rest period is governed by physiological parameters (heart rate and oral temperature).

**Table 1. Percent Sunshine Factors  
Heat Stress Prevention and Monitoring**

<b>Percent Sunshine (%)</b>	<b>Cloud Cover</b>	<b>Sunshine fraction</b>
100	No cloud cover	1.0
50	50% cloud cover	0.5
0	Full cloud cover	0.0

**Table 2. Physiological Monitoring Schedule  
Heat Stress Prevention and Monitoring**

<b>Adjusted Temperature</b>	<b>Level D (Permeable clothing)</b>	<b>Level C, B, or A (Nonpermeable clothing)</b>
90°F (32.2°C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5°F (30.8° - 32.2°C)	After each 60 minutes of work	After each 30 minutes of work
82.5° - 87.5°F (28.1° - 32.2°C)	After each 90 minutes of work	After each 60 minutes of work
77.5° - 82.5°F (25.3° - 28.1°C)	After each 120 minutes of work	After each 90 minutes of work
72.5° - 77.5°F (22.5° - 25.3°C)	After each 150 minutes of work	After each 120 minutes of work

**Example:** Site personnel anticipate wearing level C (impermeable clothing) during site activities. The air temperature is 80°F and there are no clouds in the sky (100% sunshine). The adjusted temperature is calculated in the following manner:

Adjusted Temperature (Adj T °F) = Actual Temperature (Amb T °F) + (13 x sunshine fraction)

Adj T °F = 80°F + (13 x 1.0)

Adj T °F = 93°F

Using Table 2, the pulse rate, oral temperature and body water loss monitoring would be conducted after each 15 minutes of work. The adjusted temperature may need to be redetermined if the percent sunshine and ambient temperature changes drastically during site work.

If an individual's heart rate exceeds 110 beats per minute at the beginning of the rest period, that individual will continue to rest until his or her heart rate drops to baseline; the next work period is then decreased by 33%.

## FLD 06 COLD STRESS

Three major factors that contribute to cold stress are cold temperatures, dampness, and wind velocity. Persons working outdoors in low temperatures, especially in wet or windy conditions, are subject to cold stress. Exposure to extreme cold for even a short time can cause severe injury to the surface of the body, or result in cooling of the body core temperature which, if unchecked, can be fatal. Site workers must learn to recognize and treat the various forms of cold stress.

### RELATED FLDs

*FLD 02 – Inclement Weather*

*FLD 17 – Diving*

*FLD 19 – Working Over or Near Water*

*FLD 25 – Working at Elevation/Fall Protection*

### GENERAL INFORMATION

Body heat is conserved through the constriction of surface blood vessels. This constriction reduces circulation at the skin layers and keeps blood nearer the body core. Loss of body heat can occur through:

1. Respiration – The process of breathing; inhaling and exhaling air. Heat is lost when breathing cold air into the lungs.
2. Evaporation – Heat loss from the body by vaporization of water from the skin surface.
3. Conduction – Direct transfer of body heat by contact with a cooler object. Conduction may occur when sitting on snow, touching cold equipment, and working in the rain. Body heat is lost rapidly when a person becomes wet. Most clothing loses approximately 90 percent of its insulating properties when wet. Additionally, water conducts heat 240 times faster than air; thus, the body cools suddenly when the layer of clothing that contacts the skin becomes wet.
4. Radiation – Heat radiated outward from the body to a cooler environment. The greatest amount of body heat is lost from uncovered surfaces of the body, especially the head, neck, and hands.
5. Convection – Heat transferred to cool air moving across the surface of the body. The body continually heats a thin layer of air next to the skin. Clothing retains this warm surface layer of air. If this warm air is removed by air currents (wind), the body will be cooled while attempting to rewarm the surface air. Wind chill is the chilling effect of moving air in combination with low temperature.

Other factors may contribute to cold stress, such as:

1. Medications, including antidepressants, sedatives, tranquilizers and some heart medications may affect the body's ability to thermo-regulate.
2. Dehydration, or the loss of body fluids, occurs in a cold environment and may increase the susceptibility of workers to cold injury due to a significant change in blood flow to the extremities.
3. Heavy work typically causes sweating that will result in wet clothing.

4. A worker's predisposing health condition such as cardiovascular disease, diabetes, and hypertension.
5. Older people are not able to generate heat as quickly, thus may be at more risk than younger adults.

When the body is unable to warm itself, serious cold-related illness and injuries may occur, including permanent tissue damage and possible death.

## **RECOGNITION AND RISK ASSESSMENT**

In the planning stages of a project, the potential for cold-related hazards must be considered in the site-specific Health and Safety Plan (HASP) and during risk assessment. The Field Safety Officer (FSO) must make decisions on the proper safety procedures and recommend them to the site manager. Each worker must evaluate the risk associated with his or her work and be actively alert to these hazards. Any site worker may stop work if safety procedures are not followed or the risk is too great.

### **Low Temperature + Wind Speed + Wetness = Injuries and Illness**

The Cold Stress Equation (OSHA Card-3156) is a quick-reference tool provided on the Weston Portal.

## **Frostbite**

Frostbite is the freezing of tissue and most commonly affects the toes, ears, fingers, and face. Frostbite occurs when an extremity loses heat faster than it can be replaced by the circulating blood. Frostbite may result from direct exposure to extreme cold or cool, high wind. Damp socks and shoes may contribute to frostbite of the toes.

Signs and symptoms of frostbite include:

- Cold, tingling, aching, or stinging feeling followed by numbness
- Skin color is red, purple, white, or very pale and is cold to the touch
- Blisters may be present (in severe cases)

Treatment for frostbite:

- Call for emergency medical assistance.
- Move the victim indoors and/or away from additional exposure to cold, wet, and wind.
- Wrap the affected area in a soft, clean cloth (sterile, if available).
- Give a warm drink (water or juices, not coffee, tea or alcohol). Do not allow the victim to smoke.
- Do not rub the frostbitten part (this may cause gangrene).
- Do not use ice, snow, gasoline or anything cold on the frostbitten area.
- Do not use heat lamps or hot water bottles to rewarm the frostbitten area.
- Do not place the frostbitten area near a hot stove.
- Do not break blisters.
- After rewarming, elevate the area and protect it from further injury.

## **Hypothermia**

Hypothermia means “low heat” and is a potentially serious condition. Systemic hypothermia occurs when body heat loss exceeds body heat gain and the body core temperature falls below the normal 98.6°F. While some hypothermia cases are caused by extremely cold temperatures, most cases develop in air

temperatures between 30° and 50°F, especially when compounded with water immersion and/or windy conditions.

The victim of hypothermia may not know, or refuse to admit, that he or she is experiencing hypothermia. All personnel must be observant for these signs for themselves and for other team members. Hypothermia can include one or more of the following symptoms.

- Cool bluish skin
- Uncontrollable shivering
- Vague, slow, slurred speech
- Irritable, irrational, or confused behavior
- Memory lapses
- Clumsy movements, fumbling hands
- Fatigue or drowsiness

Below the critical body core temperature of 95°F, the body cannot produce enough heat by itself to recover. At this point, emergency measures must be taken to reverse the drop in core temperature. The victim may slip into unconsciousness and can die in less than 2 hours after the first signs of hypothermia are detected. Treatment and medical assistance are critical.

Treatment for hypothermia:

- Call for emergency medical assistance.
- Do not leave the victim alone.
- Prevent further heat loss by moving the person to a warmer location out of the wind, wet, and cold.
- Remove cold, wet clothing and replace with warm dry clothing or wrap the victim in blankets.
- If the victim is conscious, provide warm liquids, candy, or sweetened foods. Carbohydrates are the food most quickly transformed into heat and energy. Do not give the victim alcohol or caffeine.
- Have the person move their arms and legs to create muscle heat. If they are unable to move, place warm bottles or hot packs in the arm pits, groin, neck, and head. Do not rub the arms and legs or place the person in warm water.

## **Prevention and Protection**

The following general guidelines are recommended for preventing or minimizing cold stress:

- Wear loose, layered clothing, masks, woolen scarves, and hats. Wear liners under hard hats
- Protect hands with gloves or mittens.
- Never touch cold metal with bare hands.
- Wear waterproof, slip-resistant, insulated boots
- Use chemical foot and hand warmers (commercially available) inside boots and gloves.
- In extreme cold, cover the mouth and nose with wool or fur to “pre-warm” the air you breathe.
- If wearing a face protector, remove it periodically to check for frostbite.

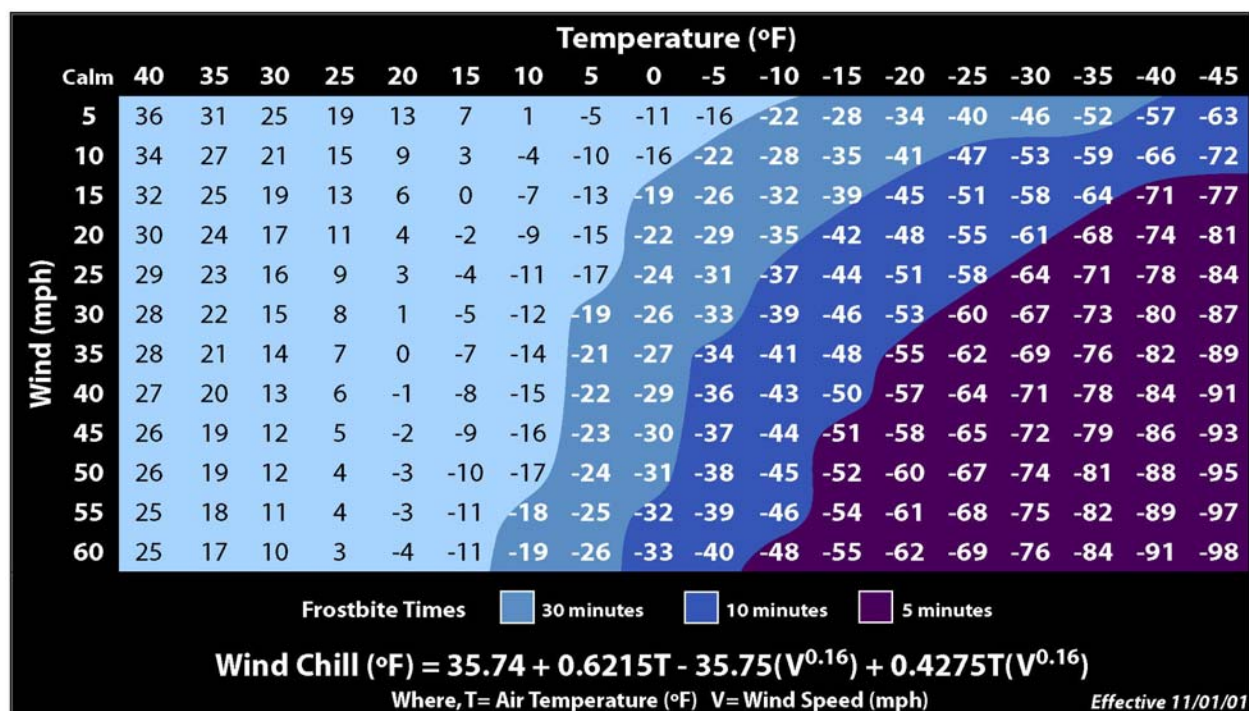
- Ensure that clothing remains secure around the body, especially at the neck and waist.
- If required to wear chemical protective clothing, remember that it generally does not afford protection against cold stress. In many instances, chemical protective clothing increases susceptibility. Dress carefully if both chemical protection and thermal insulation are required.
- Remove outer layers to avoid overheating and soaking clothing with perspiration; replace layers to avoid becoming chilled.
- Keep clothes dry by wearing water-resistant and wind-resistant clothing and outerwear.
- Wear clothing that will “breathe” or allow water vapor to escape.
- Eat well-balanced meals, ensure adequate intake of liquids and avoid alcoholic beverages. Drink warm sweet beverages and soups. Limit the intake of caffeinated drinks due to the diuretic and circulatory effects.
- Utilize available warm shelters and implement work-rest schedules.
- If warm shelters are not available, use cars/vehicles as shelter from the cold. (Ensure that tailpipes are not covered by heavy snowfall).
- Use radiant heaters to provide warmth (if using propane heaters ensure adequate ventilation to avoid carbon monoxide poisoning).
- Monitor yourself and others for changes in physical and mental condition.
- Use the buddy system or supervision to ensure constant protective observation.
- If heavy work must be done, resulting in sweating/wet clothing, take rest periods in heated shelters and change into dry clothing as necessary.
- New employees should not work full-time in the cold during the first days of employment until they become accustomed to the working conditions and the use of required protective clothing.
- Include the weight and bulkiness of clothing in estimating the required work performance and weights to be lifted by the worker.
- Arrange the work in such a way that sitting or standing still for long periods is minimized.
- Perform work protected from drafts to the greatest extent possible. If possible, shield the work area from wind.
- Instruct workers in safety and health procedures. The training program should include, as a minimum, instruction in:
  - Signs and symptoms of frostbite, impending hypothermia, or excessive cooling of the body
  - Proper use of clothing
  - Proper eating and drinking habits
  - Safe work practices
  - Proper rewarming procedures and appropriate first aid treatment
- Tables 1 and 2 should be consulted to adjust working schedules for wind chill conditions based on equivalent chill temperature (ECT). These tables are guidelines only; ambient temperatures and wind conditions should be monitored frequently and work schedules adjusted as required. If workers show signs or symptoms of cold stress, the work schedule must be adjusted, as required.



## Work/Warming Regimen

Work should be performed in the warmest part of the day. If work is performed continuously in the cold or winter conditions or where rain or cool winds are expected, provide heated warming shelters, tents, cabins, or break rooms nearby. Encourage workers to use the shelter at regular intervals depending on the severity of the cold exposure. Table 2, Cold Work/Warmup Schedule for 4-Hour Shifts, provides guidance for working in severe cold weather. The onset of heavy shivering, the feeling of excessive fatigue, drowsiness, irritability, or euphoria are indications for immediate return to the shelter. Pain, numbness, or tingling in the extremities are indications for immediate return to the shelter. When entering the heated shelter, the outer layer of clothing should be removed and the remainder of the clothing loosened to permit sweat evaporation, or the worker should change into dry clothing. Never return to work in wet clothing.

**Table 1. Wind Chill Chart**



NWS/NOAA

**Table 2. Cold Work/Warmup Schedule for 4-Hour Shifts**

EQUIVALENT CHILL TEMPERATURE	MAXIMUM WORK PERIOD	NO. OF BREAKS
≥-24°F	Normal	1
-25° to -30°F	75 minutes	2
-31° to -35°F	55 minutes	3
-36° to -40°F	40 minutes	4
-41° to -45°F	30 minutes	5
≤-46°F	Stop work	Stop work

## **FLD 11 ROUGH TERRAIN/ATV USE**

### **RELATED FLDs**

*FLD 02 – Inclement Weather*

*FLD 05 – Heat Stress Prevention and Monitoring*

*FLD 06 – Cold Stress*

*FLD 22 – Heavy Equipment Operation*

*FLD 47 – Clearing, Grubbing, and Logging Operations*

*FLD 57 – Motor Vehicle Safety*

### **HAZARD**

Physical hazards associated with rough terrain include vehicle accidents, heavy equipment incidents, falling, slipping, and tripping.

Driving vehicles on uneven surfaces creates a possibility of the vehicle rolling, getting stuck in mud or ditches, or of an accident due to flat tires or striking obstacles and other vehicles.

When working on foot, steep inclines and heavy or downed vegetation can hide holes or breaks in the terrain, increasing the risk of slips, trips, and falls.

### **RECOGNITION AND RISK ASSESSMENT**

Rough terrain complicates work activities and adds to or increases risk. In the planning stages of a project, rough terrain must be considered as a physical hazard and identified in the site-specific health and safety plan (HASP). Risk assessment is usually accomplished from site history information (i.e., site topography) and on site by the Field Safety Officer (FSO).

### **HAZARD PREVENTION AND PROTECTION PROGRAMS**

#### **Safety on Foot**

Personnel working on rough terrain should maintain a high level of physical conditioning due to increased body stress and exertion.

The site crew should be alert and observe terrain while walking to minimize slips, trips, and falls.

Boots should be ankle high or higher to provide additional support and stability.

Work will be completed in adequate natural light or sufficient illumination will be maintained.

Site personnel will conduct an initial walkover and the “buddy system” will be implemented.

Emergency communications such as a cell phone or two-way radio should be carried at all times.

Personnel should be aware of potential hazards and ensure the availability of first-aid supplies and knowledge of the location of the nearest medical assistance.

#### **VEHICLE SAFETY**

Vehicle drivers and passengers will wear seatbelts at all times.

Hazards can be prevented by ensuring regular maintenance is performed on vehicles and all safety features are working. Have brakes and wheel bearings of vehicles used off road or in four wheel drive inspected at increased frequency (suggest inspections at twice the manufacturer's recommended frequency).

In order to minimize accidents, site surveillance on foot may be required to ensure clear driving paths.

Minimize side hill travel. Travel straight up and down hills whenever possible. Passengers will not be allowed when side hill travel is required.

Take into account loads or superstructure of vehicles which raise the center of gravity and increase risk of tipping.

Cross streams, small logs or other passable (there is adequate clearance of the undercarriage) obstructions at right angles.

Four wheel drive vehicles should be used if terrain conditions are wet, frozen, broken, or otherwise deemed unsafe for two wheel drive vehicles by the FSO. Use of vehicles off-road will be specifically addressed in the HASP and personnel operating vehicles will be checked for proficiency.

- Before moving a vehicle in the field, first walk the route of travel, inspecting for depressions, stumps, gullies, ruts, and similar obstacles.
- Always check the brakes of a vehicle before traveling, particularly on rough, uneven, or hilly ground.
- Check the complete drive train of a carrier at least weekly for loose or damaged bolts, nuts, studs, shafts, and mountings.
- Engage the all wheel drive when traveling off highway on hilly terrain.
- Increase tire pressures before traveling in hilly terrain (do not exceed rated tire pressure).
- Use the assistance of someone on the ground as a guide when lateral or overhead clearance is close.
- After the vehicle/equipment has been moved to a new site, set all brakes and/or locks. When grades are steep, block the wheels.

## **Definitions**

**Class I, All-terrain vehicle (ATV):** A motorized off-highway vehicle, 50 in. (127 cm) or less in width, having dry weight of 800 lbs (362.9 kg) or less, and traveling on three or more low pressure tires (10 lbs [4.5 kg] psi or less), with a seat designed to be straddled by the operator.

**Class I, Category G, ATV:** An ATV intended for general recreational and utility use.

**Class I, Category U, ATV:** An ATV intended primarily for utility use.

**Class II, ATV:** A motorized off-highway vehicle with a width which exceeds 50 in. (127 cm) or having a dry weight that exceeds 800 lbs (362.9 kg), traveling on four or more low-profile, low-pressure tires (10 lbs [4.5 kg] psi or less) and having a bench seat.

**NOTE:** Utility Vehicles are designed to perform off-road utility tasks such as passenger and cargo transportation and are addressed separately below. Examples are Rangers, Rhino, M-Gators, Gators, and Mules.

Rollover Protective Structure (ROPS). A cab or frame that provides a safe environment for the tractor operator in the event of a rollover.

## **ALL TERRAIN VEHICLES (ATVS)**

### **Qualifications**

ATV operators will have completed a nationally recognized accredited ATV training course (such as provided by the Specialty Vehicles Institute of America or in-house resources that have been certified as trainers by an accredited organization) prior to operation of the vehicle.

The operator must pass an operating skills test prior to being allowed to operate an ATV. Proof of completion of this training will be maintained.

### **Equipment**

All ATVs shall be equipped with:

- An operable audible warning device (horn);
- Headlights (if it will be used during hours of darkness);
- Taillights; and
- Brake lights.
- Mufflers and spark arresters.

All Class II ATVs will be equipped with ROPS and seatbelts

### **Operation**

Only Class I and Class II ATVs with four or more wheels may be used. Class III ATV's may not be used.

The manufacturer's recommended payload will not be exceeded at any time.

Gloves and an approved motorcycle helmet with full-face shield or goggles will be worn at all times while operating a Class I ATV.

An ATV will not be driven on public roadways except to cross the roadway, and it will only be driven on a public roadway at designated crossing points or with a road guard (no paved road use unless allowed by the manufacturer).

A copy of the operator's manual will be kept on the vehicle and protected from the elements (if practicable).

Tires shall be inflated to the pressures recommended by the manufacturer.

Passengers are prohibited on Class I ATVs.

## UTILITY VEHICLES

Utility vehicles are defined as specialty Class II ATVs designed to perform off-road utility tasks such as passenger and cargo transportation. Examples are Rangers, Rhino, M-Gators, Gators, and Mules.

Utility vehicle operators shall be trained and familiar with the use of all controls; understand proper moving, stopping, turning and other operating characteristics of the vehicle. Operators must review all training materials provided by the manufacturer for the specific vehicles, and training should be in accordance with appropriate manufacturer recommendations. A copy of the operator's manual shall be kept on the vehicle at all times and protected from the elements. At a minimum, training should address:

- Basic riding tips from the manufacturer's published literature for each vehicle.
- Reading terrain.
- Climbing hilly terrain.
- Descending a hill.
- Traversing a slope.
- Riding through water.
- Cargo carriers and accessories.
- Loading and unloading.
- Troubleshooting.
- Proper preventative maintenance, (i.e., oil levels, tire pressure requirements and scheduled maintenance requirements according to the manufacturer's guidelines.).

Utility vehicles shall be equipped with:

- Operable audible warning device (horn).
- Headlights.
- Taillights.
- Brake lights.
- Seatbelts.
- ROPS.

Occupancy in utility vehicles is limited to manufacturer designated seating that has built-in seatbelts. Passengers may not ride in the vehicle's back cargo area unless the vehicle is otherwise equipped. Note: When used for emergency response, medical litters may be placed in the back cargo area but must be secured as described below.

The manufacturer's recommended load carrying capacity, personnel capacity, or maximum safe vehicle speed shall not be exceeded at any time.

Cargo items will be secured as necessary to prevent movement/tipping. All loads over fifty pounds (to include medical litters) must be securely strapped to cargo tie-downs in the rear and to the cargo shelf in the front.

Seatbelts will be worn by operators and passengers of specialty vehicles where installed by the manufacturer. Operators and passengers shall wear goggles at all times when a utility vehicle, not equipped with a windshield, is in motion.

Utility vehicles will not normally be driven on public roadways except to cross the roadway, and will only be driven on a public roadway at designated crossing points or with a road guard. Utility vehicles that are allowed to operate outside a controlled work area and/or on public roads will meet the minimum vehicle safety standards in accordance with 49 CFR 571.5, to include ROPs, seatbelts and placement of “Slow Moving Vehicle” emblems where required.

Manufacturer-installed safety equipment will be maintained in working order and used in compliance with the requirement of this regulation and in accordance with manufacturer’s recommendations.

## **RULES**

Observe the following practices to help prevent accidents:

- Do not misuse utility vehicles.
- Reduce speed and exercise extreme caution on slopes or on rough ground.
- Do not overload vehicle and avoid shifting loads. Reduce load when operating over rough or hilly terrain.
- Do not stop or start suddenly when going uphill or downhill. Be especially cautious when changing direction on slopes.
- Stay alert for holes, rocks, and other hidden hazards in the terrain.
- Keep away from drop-offs, ditches, embankments, as well as ponds and other bodies of water. The machine could suddenly turn over if a wheel is over the edge of a cliff or ditch, or if an edge caves in.
- Keep front wheels straight at crest of hill or going over bumps.
- When descending a hill, remove foot from accelerator and apply brakes to reduce speed and maintain control.

## **Transport Loads Safely**

- Be sure load is evenly distributed.
- Do not load above the load guard.
- Securely anchor all loads in cargo box.
- Reduce cargo box capacity when operating on rough or hilly terrain.
- Use existing trails. Avoid terrain such as dangerous slopes and impassable swamps. Watch carefully for sharp bumps, holes, ruts, or obstacles.
- Look ahead at terrain. Know what is coming and be prepared to react. Be alert for hazards.
- Keep front wheels straight at the crest of a hill or going over bumps.
- Reduce speed according to trail, terrain, and visibility conditions.
- The passenger should always use the hand holds.

### **Climbing or Descending a Hill**

- Always use the brakes when going down slopes, the utility vehicle can speed up (freewheel) going down a slope. Engine or clutch braking effect is minimal.
- Balance loads evenly and secure them. Braking could shift the load and affect vehicle stability.
- Sit on the center of the seat and keep both feet within the foot platform.
- Never drive past the limit of visibility. Slow down near the crest of a hill until getting a clear view of the other side.
- If the vehicle stops or loses power going up a hill, lock the park brake to hold the vehicle on slope. Maintain direction of travel and release the brake slowly. Back straight down hill slowly while maintaining control. Do not turn the vehicle sideways. The vehicle is more stable in a straight forward or rearward position.
- If the utility vehicle begins to tip, turn the front wheel downhill to gain control before proceeding.

### **Riding Through Water**

- Avoid water whenever possible. If the drive belt becomes wet, slippage will occur and the vehicle will lose power.
- Never cross any body of water where the depth may be unknown to the operator. As an operational guideline, deep water is considered anything in excess of 152 mm (6 in.) in depth. Tires may float, making it difficult to maintain control.
- Choose a course within the waterway where both banks have a gradual incline. Cross at a point known to be safe.
- Proceed at a slow steady speed to avoid submerged obstacles and slippery rocks.
- Avoid water crossings where the operation of a utility vehicle may cause damage to waterway beds or erode waterway shoreline.

## **FLD 12 HOUSEKEEPING**

Hazards associated with poor housekeeping include but are not limited to slips, trips, falls, punctures, cuts, and fires. Good housekeeping is a critical element when working under all FLDs. Housekeeping inspection checklists are available on-line on the Weston Environmental, Health, and Safety (EHS) Portal site.

### **RECOGNITION AND RISK ASSESSMENT**

Good housekeeping is an important element of incident prevention. Good housekeeping should be planned at the beginning of the job and carefully supervised and monitored through project completion.

Housekeeping requirements must be addressed in the planning stages of a project Health and Safety Plan (HASP). Risk assessment can be accomplished in the development stages of a project by listing in the site-specific HASP, good housekeeping requirements and the hazards associated with poor housekeeping (e.g., slips, trips and falls). The Field Safety Officer (FSO) must make decisions on the proper safety procedures and recommend them to the site manager. Each worker must evaluate the risk associated with his or her work and be actively alert to these hazards. Any site worker may stop work if safety procedures are not followed or the risk is too great.

### **PREVENTION AND PROTECTION**

Incidents can be prevented or minimized by following the general guidelines described below:

1. Plan ahead. A materials storage area which has been planned is more orderly than one which has developed haphazardly.
2. Assign responsibilities. If the size of the job and work force merit, a person should be assigned specific responsibility for clean up. Ideally, each individual should pick up his or her work area and help keep the site neat.
3. Implement the program. Housekeeping must be part of the daily routine, with clean-up being a continuous procedure.

Incidents caused by poor housekeeping can also be prevented by adherence to the following rules.

Lunch areas should be kept clear of empty bottles, containers, and papers. Trash disposal cans should be provided. An effective means of preventing litter is the provision of suitable receptacles for hazardous waste as well as no hazardous waste.

Accumulation of flammable and combustible liquids on floors, walls, and other areas is prohibited. All spills of flammable and combustible liquids must be cleaned up immediately.

Combustible waste such as soiled rags and paper is to be stored in a safe place (e.g., covered metal container) and disposed of regularly.

Materials must be stacked and stored to prevent sliding or collapsing.

WESTON project managers and WESTON subcontractors should provide sufficient personnel and equipment to ensure compliance with all housekeeping requirements.

Work will not be allowed in areas that do not comply with the requirements of this FLD.



The FSO and WESTON subcontractors will inspect the work area daily for adequate housekeeping and record findings on the daily inspection report.

Adequate lighting should be provided in or around all work areas, passageways, stairs, ladders, and other areas used by personnel.

All stairways, passageways, gangways, decontamination lines, and accessways shall be kept free of materials, supplies, and obstructions at all times.

Loose or light material should not be stored or left on roofs or floors that are not enclosed, unless it is safely secured.

Tools, materials, extension cords, hoses, or debris are to be used, disposed of, and stored so as not to cause a tripping or other hazard.

Tools, materials, and equipment subject to displacement or falling should be adequately secured.

Empty bags that contained lime, cement, and other dust-producing materials should be removed periodically, as specified by the designated authority.

Protruding nails in scrap boards, planks, and timbers should be removed, hammered in, or bent over flush with the wood, unless placed in containers or trucks for removal.

Walkways, runways, and sidewalks should be kept clear of excavated material or other obstructions and no sidewalks should be undermined unless shored to carry a minimum live load of 125 pounds per square foot.

Containers should be provided for storing or carrying rivets, bolts, and drift pins, and secured against accidental displacement when aloft.

When rivet heads are knocked off or backed out, they should be prevented from falling.

Form and scrap lumber and debris should be cleared from work areas, passageways, and stairs in and around building storage yards and other structures.

All storage and construction sites should be kept free of the accumulation of combustible materials.

All materials should be maintained in neat stockpiles for ease of access. Aisles and walkways should be kept clear of loose materials and tools.

Areas prone to weeds and grass should be kept mowed. A standard procedure should be established for cleanup of such areas, as specified by the FSO.

Rubbish, brush, long grass, or other combustible material must be kept from areas where flammable and combustible liquids are stored, handled, or processed.

## **FLD 13 STRUCTURAL INTEGRITY**

### **RELATED FLDs AND PROGRAM**

*FLD 02 – Inclement Weather*

*FLD 23 – Cranes, Rigging, and Slings*

*FLD 24 – Aerial Lifts/Manlifts*

*FLD 26 – Ladders*

*FLD 27 – Scaffolding*

*FLD 28 – Excavating/Trenching*

*FLD 33 – Demolition*

*Personal Protective Equipment Program*

### **PROCEDURE**

Structural integrity hazards include those hazards associated with deteriorated conditions of containers (such as drums or tanks) and buildings (including appliances such as both elevated work platforms and fixed and portable ladders), scaffolding, and excavations or trenches. Structural integrity hazards also are associated with floor and wall opening covers and guards as well as guardrails as engineering controls for work at elevation. In construction activities, structural integrity is critical to steel erection and concrete construction. The failure of structures can cause significant injury or death to personnel.

#### **Recognition and Risk Assessment**

In the planning stages of a project and safety plan, the potential for injury due to structural integrity must be considered as a physical hazard in the site-specific Health and Safety Plan (HASP). With regard to the construction issues raised above, and during demolition, the project work plans, construction specifications, and Quality Assurance Programs must be designed to ensure structural integrity during and following construction. Risk assessments must be accomplished in the development stages of a project by listing in the HASP the most likely hazards which may occur associated with structural integrity. The field safety officer (FSO) in coordination with engineering, designers, architects and quality managers must make decisions on the proper safety procedures and recommend them to the project and site management. Each worker must evaluate the risk associated with his or her work and be actively alert to these hazards. Any site worker may stop work if safety procedures are not followed or the risk is too great.

Prior to entering any building, an assessment of structural integrity must be made. Buildings on inactive sites or facilities, unused buildings, and buildings which are to be demolished require special attention. This assessment must ensure, through observation and experience, that entering and/or task activities will not expose personnel to unusual risk of falling debris, loose materials that could be dislodged by touching or walking nearby, or walking on surfaces that cannot bear the weight of personnel. For steel erection, concrete work, and demolition, qualification requirements include registered Professional Engineers (PEs) proficient in structural integrity assessment. The registered PE must also ensure that construction is performed to specifications.

## **FLD 25 WORKING AT ELEVATION/FALL PROTECTION**

This procedure establishes the minimum requirements for elevated work/fall prevention for WESTON operations.

Requirements listed in this procedure are not all-inclusive; each specific work location must be evaluated to ensure that workers are offered practical and effective means to assure safe elevated work.

Options to reduce exposures to fall hazards can be managed by reducing the number of workers exposed, relocating equipment/work areas, use of a positioning device, or by choosing different equipment options (i.e., choosing an aerial lift rather than a ladder or scaffold) and must be evaluated.

WESTON will take every reasonable precaution to protect the health and safety of our employees. Implicit in this policy is the requirement that employees use effective fall protection systems when working in any situation that presents a known or foreseeable fall exposure.

### **REFERENCES**

29 CFR 1910 Subpart D, *Walking-Working Surfaces*  
29 CFR 1926 Subpart M, *Fall Protection*; Subpart L, *Scaffolds*

*ANSI/ASSE Z.359-2007; Fall Protection Code*

Related FLDs:

*FLD 24 Aerial Lifts*

*FLD 26 Ladders*

*FLD 27 Scaffolding*

### **RESPONSIBILITY**

As identified in ANSI/ASSE Z359.2-2007:

WESTON will assure that adequate and timely resources are available to support this fall protection program.

The Corporate Environmental Health and Safety Director will serve as (or directly appoint) the Program Administrator with responsibilities for developing implementing, monitoring and evaluating WESTON's Fall Protection Program.

Local Management (Division Manager, Client Services Manager, Project Manager, and Site Manager) is responsible for ensuring that fall protection programs and procedures are implemented and followed within their areas of responsibility.

The Division Environmental Health and Safety Managers will serve as (or directly appoint) Qualified Persons for this Program.

The function of Competent Persons in Fall Protection will be held by those employees who have completed WESTON's Fall Protection Competent Person training, or those named by the Program Administrator as having equivalent and accepted credentials. A Competent Person must be available at any location with fall hazards meeting the criteria outlined within this Program.

Employees must be trained and authorized to perform tasks with exposure to fall hazards as outlined within this Program.

Provisions for prompt rescue must be evaluated and implemented prior to putting employees into situations with the risk of falling.

Training requirements for the above are identified in the Training Section of this program.

## **GENERAL GUIDELINES**

Work performed at elevation where there is a risk of injury due to falls, will be performed in accordance with the following general guidelines:

- Activities with potential fall hazards will be identified as part of the pre-job planning hazard assessment process.
- Fall hazards shall be identified and mitigated during the design or pre-planning phase on all new equipment and/or facility design (Safety through Design).
- Fall protection for any activity must evaluate and follow the sequence: 1) elimination via design or management; 2) passive protection via guardrails or nets; and 3) active protection via fall arrest systems, or monitoring systems.
- As available, exposure to fall hazards will be managed by reducing the number of workers exposed, relocating equipment/work area, or by choosing different equipment options (i.e., choosing an aerial lift rather than a ladder or scaffold).
- Workers performing activities with fall hazards not mitigated by installation of standard guardrails, walls, or other barriers will be protected by the use of fall protection equipment or safety monitoring system.
- Equipment (aerial lifts, ladders, body harnesses, lanyards, etc.) shall be visually inspected by trained workers or the Field Safety Officer (FSO) prior to each use. Defective equipment shall be tagged, removed from service immediately, and the Site Manager notified.
- Each employee performing construction work on a walking/working surface (horizontal and vertical) with an unprotected side or edge which is 6 feet (1.8m) or more above a lower level shall be protected from falling by the use of guardrail systems, safety net systems, or personal fall arrest systems. Employees performing work under General Industry Standards (29CFR1910) must provide protection at 4 feet.
- WESTON shall:
  - Review and approve selected fall protection equipment or alternative fall hazard control measures for unusual circumstances or for the use of fall protective equipment not previously approved
  - Perform periodic assessments of operations to evaluate performance and assure compliance with this FLD.
  - Provide technical guidance and regulatory interpretations to ensure consistent and compliant implementation of this program.

- Provide comments on and communicate changes in fall prevention regulations.
- Ensure an adequate supply of standard fall protection equipment is available for issue.
- Ensure portable ladders and fall protection equipment are inspected prior to placing them in service.
- In the event an employee falls, or some other related, serious incident occurs, (e.g., a near miss), investigate the circumstances of the fall or other incident to determine if the fall protection plan needs to be changed (e.g. new practices, procedures, or training) and implement those changes to prevent similar types of falls or incidents.

## **FALL PROTECTION SYSTEMS**

The following is not a comprehensive outline of fall protection methods for all fall hazard situations. The PM and FSO must evaluate each site and work activity for appropriate fall protection and worker safety requirements as outlined in OSHA 29 CFR 1910 and 1926. WESTON's Program Administrator and/or Qualified Person(s) must be made aware of unique situations not fully covered by this FLD and/or listed regulatory reference.

### **Personal Fall Arrest Systems**

A personal fall arrest system (PFAS) must do the following:

- Limit maximum arresting force on an employee to 1,800 pounds when used with a body harness;
- Be rigged so that an employee can neither free-fall more than 6 feet nor contact any lower level;
- Bring an employee to a complete stop and limit maximum deceleration distance an employee travels to 3.5 feet and
- Have sufficient strength to withstand twice the potential impact energy of an employee free-falling a distance of 6 feet or the free-fall distance permitted by the system, whichever is less.

Key components of the PFAS must be in place and properly used to provide maximum worker protection.

#### Anchor Point

- Anchor Point or Anchorage: Commonly referred to as a tie-off point. Anchorages must be capable of supporting 5,000 pounds of force per worker or designed with a safety factor of 2.

#### Harnesses

The personal protective equipment worn by the worker (i.e., full-body harness)

- The only form of body wear acceptable for fall arrest is the full-body harness.
- Should be selected based on work to be performed and the work environment.

#### Connecting Device

Connecting Device: The critical link which joins the harness to the anchorage/anchorage connector (e.g., shock-absorbing lanyard, fall limiter, self-retracting lifeline, rope grab). The connecting device includes the hardware (e.g., snaphooks, carabiners, d-rings, etc.) associated with both the connecting device and the harness.

- Potential fall distance must be calculated to determine type of connecting device to be used.

## **Construction and Use**

### Safety Harnesses, Lanyards, and Lifelines

- The construction of this equipment shall comply with requirements set forth in ANSI A10.14, American National Standard for Safety Belts, Harnesses, Lanyards, Lifelines, and Drop Lines for Construction and Industrial Use and ANSI Z359.1, Safety Requirements for Personal Fall Arrest Systems, Subsystems, and Components for General Industry.
- Each belt and harness assembly shall bear identification marks that identify the manufacturer. The identification shall also bear the date of manufacture and "ANSI A10.14" or "ANSI Z359.1-2007." .
- Each belt, harness, lanyard, and lifeline assembly shall be visually inspected for defects prior to each use.
- Each belt and harness assembly shall be inspected, according to the manufacturer's recommendations. Faulty equipment shall not be used and shall be tagged as defective or immediately destroyed.
- Body belts (safety belts) may only be used in conjunction with a restraint line to prevent a worker from reaching the edge of a roof/elevated platform. Body belts shall not be used as part of a fall arrest system.
- Personal fall protection equipment (harnesses, lanyard, lifelines, etc.) subjected to an arresting fall or a shock load shall not be reused..
- Fall arrest systems shall be tested as complete systems. Only components that are fully compatible with one another shall be used together.
- Anchorage used for attachment of personal fall arrest equipment shall be capable of supporting at least 5,000 pounds per worker attached. Anchorage for suspended platforms (Boatswain chair, two point suspended scaffold, etc.) shall be independent of any anchorage being used to support or suspend the platform from which work is being performed.
- Anchorage points for positioning devices which automatically limit free fall distances to 2 feet or less shall be capable of supporting at least twice the potential impact load of a worker's fall or 3000 pounds, whichever is greater.
- Self-retracting lifelines and lanyards that automatically limit free fall distance to 2 feet or less shall be capable of sustaining a minimum tensile load of 3,000 pounds applied to the device with the lifeline or lanyard in the fully extended position.
- Self-retracting lifelines and lanyards that do not limit free fall distance to 2 feet or less, ripstitch lanyards, and tearing and deforming lanyards shall be capable of sustaining a minimum tensile load of 5,000 pounds applied to the device with the lifeline or lanyard in the fully extended position.
- Ropes and straps (webbing) used in lanyards, lifelines, and strength components of body belts and body harnesses shall be made of synthetic fibers.
- Lanyards and vertical lifelines must have a minimum breaking strength of 5,000 pounds. .

### Connectors

Connectors, including D-rings and snaphooks, must be made from drop-forged, pressed or formed steel, or equivalent materials. They must have a corrosion-resistant finish, with smooth surfaces and edges to prevent damage to connecting parts of the system.

Snaphooks and carabiners must meet the requirements of ANSI/ASSE Z359.1-2007.

D-Rings must have a minimum tensile strength of 5,000 pounds, and be proof-tested to a minimum tensile load of 3,600 pounds without cracking, breaking, or becoming permanently deformed.

Snaphooks must have a minimum tensile strength of 5,000 pounds, and be proof-tested to a minimum tensile load of 3,600 pounds without cracking, breaking, or becoming permanently deformed. They must also be locking-type, double-locking, designed and used to prevent disengagement.

Unless it is designed for the following connections, snaphooks must not be engaged:

- Directly to webbing, rope, or wire.
- To each other.
- To a D-ring to which another snaphook or other connector is attached.

#### Positioning Device Systems

These body harness systems are to be set up so that a worker can free fall no farther than 2 feet . They shall be secured to an anchorage capable of supporting at least twice the potential impact load of an employee's fall or 3,000 pounds, whichever is greater. Requirements for snaphooks, D-rings, and other connectors used with positioning device systems must meet the same criteria as those for personal fall arrest systems.

#### **Guardrails**

Top edge height of top rails, or equivalent guardrail system members, must be between 39 and 45 inches above the walking/working level, except when conditions warrant otherwise and all other criteria are met (e.g., when employees are using stilts, the top edge height of the top rail must be increased by an amount equal the height of the stilts).

Midrails, screens, mesh, intermediate vertical members, or equivalent intermediate structures, must be installed between the top edge and the walking/working surface when there is no wall or other structure at least 21 inches high.

- Midrails must be midway between the top edge of the guardrail system and the walking/working level.
- Screens and mesh must extend from the top rail to the walking/working level, and along the entire opening between rail supports.
- Intermediate members (such as balusters) between posts must be no more than 19 inches apart.
- Other structural members (such as additional midrails or architectural panels) must be installed so as to leave no openings wider than 19 inches.
- Guardrail systems must be capable of withstanding at least 200 pounds of force applied within 2 inches of the top edge, in any direction and at any point along the edge, and without causing the top edge of the guardrail to deflect downward to a height less than 39 inches above the walking/working level.
- Midrails, screens, mesh, and other intermediate members must be capable of withstanding at least 150 pounds of force applied in any direction at any point along the midrail or other member.
- Top rails and midrails must not cause a projection hazard by overhanging the terminal posts.

#### **Safety Nets**

Safety nets must be installed as close as practicable under the walking/working surface on which employees are working and never more than 30 feet below such levels. Defective nets shall not be used. Safety nets shall be inspected at least once a week for wear, damage, and other deterioration. The maximum size of each safety net mesh opening shall not exceed 36 square inches nor be longer than 6 inches on any side, and the openings, measured center-to-center, of mesh ropes or webbing, shall not exceed 6 inches. All mesh crossings shall be secured to prevent enlargement of the mesh opening. Each safety net or section shall have a border rope for webbing with a minimum breaking strength of 5,000 pounds. Connections between safety net panels shall be as strong as integral net components and be spaced no more than 6 inches apart.

Safety nets shall be installed in accordance with 29 CFR 1926 Subpart M.

## **ACTIVITIES AND SYSTEMS**

### **Hoist Areas**

Each employee in a hoist area shall be protected from falling 6 feet or more by guardrail systems or personal fall arrest systems. If guardrail systems (or chain gate or guardrail) or portions thereof must be removed to facilitate hoisting operations, as during the landing of materials, and a worker must lean through the access opening or out over the edge of the access opening to receive or guide equipment and materials, that employee must be protected by a personal fall arrest system.

### **Holes**

Personal fall arrest systems, covers, or guardrail systems shall be erected around holes (including skylights) that are more than 6 feet above lower levels. All holes (defined as any opening 2 or more inches in its least dimension) must be evaluated for falling through or tripping hazards no matter what the fall distance to lower levels is.

### **Excavations**

If the edge of the excavation is obscured, each employee at the edge of an excavation 6 feet or more deep shall be protected from falling by guardrail systems, fences, barricades, or covers. Where walkways are provided to permit employees to cross over excavations, guardrails are required on the walkway if it is 6 feet or more above the excavation.

### **Leading Edges**

Each employee who is constructing a leading edge 6 feet or more above lower levels shall be protected by guardrail systems, safety net systems, or personal fall arrest systems. If WESTON can demonstrate that it is infeasible or creates a greater hazard to implement these systems, WESTON must develop and implement a fall protection plan that meets the requirements of 29 CFR 1926.502(k).

### **Low Slope Roofs**

Each employee engaged in roofing activities on low-sloped roofs, with unprotected sides and edges 6 feet or more above lower levels shall be protected from falling by guardrail systems, safety net systems, personal fall arrest systems, or a combination of warning line systems and guardrail systems, warning line system and safety net, or warning line system and safety monitoring system. On roofs 50-feet or less in width (see Appendix A to 29 CFR 1926 Subpart M, the use of a safety monitor alone can be evaluated.



## **Warning Line Systems and Safety Monitors (Low-sloped roofing work only)**

Warning line systems consist of ropes, wires, or chains, and supporting stanchions are set up in accordance with 29 CFR 1926 Subpart M. Minimal requirements include:

- Flagged at not more than 6-foot intervals with high-visibility material.
- Rigged and supported so that the lowest point (including sag) is no less than 34 inches from the walking/working surface and its highest point is no more than 39 inches from the walking/working surface.
- Stanchions, after being rigged with warning lines, shall be capable of resisting, without tipping over, a force of at least 16 pounds applied horizontally against the stanchion, 30 inches above the walking/working surface, perpendicular to the warning line and in the direction of the floor, roof, or platform edge.
- The rope, wire, or chain shall have a minimum tensile strength of 500 pounds and after being attached to the stanchions, must support without breaking, the load applied to the stanchions as prescribed above.
- Shall be attached to each stanchion in such a way that pulling on one section of the line between stanchions will not result in slack being taken up in the adjacent section before the stanchion tips over.

Warning lines shall be erected around all sides of roof work areas. When mechanical equipment is being used, the warning line shall be erected not less than 6 feet from the roof edge parallel to the direction of mechanical equipment operation, and not less than 10 feet from the roof edge perpendicular to the direction of mechanical equipment operation.

When mechanical equipment is not being used, the warning line must be erected not less than 6 feet from the roof edge.

Safety Monitors for low-sloped roofing work will be in accordance with 29 CFR 1926 Subpart M.

Warning lines and Safety Monitoring systems are not recognized for work under the General Industry Standards.

## **Ladders**

Ladders will be used in accordance with FLD 26, *Ladders*.

## **Scaffolds**

Scaffolds will be constructed, erected, and used in accordance with FLD 27, *Scaffolding*.

## **RESCUE**

Provisions for prompt and safe rescue after a worker has fallen and remains at elevation or suspended must be evaluated and in-place before putting employees at risk of falling. **Prompt rescue (typically defined as response and communication within 6 minutes)** must be part of the planning and plans for the site or activity. Rescue procedures and equipment will meet the requirements outlined in ANSI/ASSE Z359.2 and Z359.4.

**As safety allows, the best option for rescue is employee self-rescue. The employee's physical and mental state must be taken into consideration before allowing this option.**

On-site rescue can be performed by trained employees. This rescue is typically conducted by means of ladders, aerial lifts, self-contained rope systems or other retrieval devices. On-site rescuers must meet the training requirements outlined in ANSI/ASSE Z359.2.

The use of outside rescue agencies (e.g., fire departments, technical rescue groups) will require advance planning and communication. The Safety Plan for fall protection activities will document the agency chosen and agreements established.

Rescue provisions chosen for the site or activity must document agreements above, the type equipment needed, techniques and medical provisions for suspension trauma and other injury potential, as well as off-site ambulance/medical assistance.

## **TRAINING**

- Workers performing elevated work shall be trained by a competent or qualified person in accordance with 29 CFR 1926 Subpart M and ANSI/ASSE Z359.2-2007.
- Workers required to use personal protective equipment will be instructed on its proper use and limitations and demonstrate proficiency.
- Retraining shall be conducted at a minimum every 2 years and/or when:
  - Changes in the workplace render previous training obsolete;
  - Changes in the types of fall protection systems or equipment to be used render previous training obsolete; or
  - Inadequacies in an affected worker's knowledge or use of fall protection systems or equipment indicate that the worker has not retained the necessary understanding or skill.
- Supervisors (PMs and/or SMs) must be able to recognize hazards of elevated work and understand the procedures to be followed to minimize these hazards.
- At least one named Competent Person must be on-site during any work involving potential falls from elevation. Competent Person training requires an initial course (prior to site activities) and refresher training on a minimum 2 year basis.
- Training for the Program Administrator, Qualified Persons, Competent Persons, and Rescuers will meet the content and time-frames outlined in ANSI/ASSE Z359.2-2007, Section 3.3.
- Trainers must meet the criteria outlined in ANSI/ASSE Z359.2-2007, Section 3.3.8, specifically:
  - Documented experience, knowledge, training and education equal to, or greater than the level they are instructing.
  - Documented experience, knowledge and skills in adult education methods.
  - Proof on on-going training with minimal annual equivalents to 1.6 CEUs relating to fall protection and rescue.

A written certification record shall be prepared with the name of workers trained, the date(s) of training, and the signature of the person who conducted the training. This written certification record shall be forwarded to the WESTON Safety Officer responsible for that project.

## **RECORDS/INSPECTIONS**

Fall protection hazard assessments (e.g., AHAs), site safety plans, equipment inspection forms, and employee training information will be maintained in accordance with WESTON requirements at the site or project office.

Employee training records will additionally be maintained through the EHS Track System.

All fall protection equipment shall be inspected daily before each use by the user and periodically in accordance with the equipment manufactures requirements. In all cases fall protection equipment must be inspected at least annually by a competent person, other than the user.

## **FLD 26 LADDERS**

### **REFERENCES**

ANSI A-14.1, A-14.2, A-14.3  
29 CFR 1910.25, 1910.16, 1910.27

### **RELATED FLDs**

*FLD 25 – Working at Elevation/Fall Protection*

#### **Portable Ladders**

Portable ladders must be used for their designed purpose only. Portable ladders must be used, maintained, and constructed according to American National Standards Institute (ANSI) Standards A-14.1 and A-14.2, Occupational Safety and Health Administration (OSHA) 29 CFR 1910.25 and .26 and manufacturer's instructions.

#### Inspection

Portable ladders must be examined for defects prior to use. Examination shall include, but not be limited to, ensuring that:

1. Joints between steps or rungs are tight.
2. Hardware and fittings are secure, and rivets are not sheared.
3. Metal bearings (e.g., locks, wheels, pulleys) are lubricated.
4. Rope on extension ladders is in good condition.
5. Rungs are not loose, cracked, bent, or dented; are free of splinters or splinters; and are treated to prevent slipping.
6. Side rails are not cracked, bent, or dented and are free of splinters.

**Note: defective ladders must not be used.** Ladders found to be defective should be clearly tagged to indicate NO USE, if repairable, or destroyed immediately if repair is not possible.

#### Use Requirements

Ladders must be set on a flat, firm surface with both handrails in contact with an upper support which is sufficiently strong and rigid.

Straight ladders must have secure footing provided by a combination of safety feet, top of ladder tie-offs and mud sills, or a person holding the ladder to prevent slipping.

When middle or top sections of sectional ladders are used as bottom sections, they must have safety feet.

The ratio of the distance to the foot of a ladder from the base of the vertical plane to the height from the base to the top of the vertical plane when the ladder rests on the top of the vertical plane shall be no more than 1:4 and no less than 1:3 (e.g., 1 foot out from a wall for every 4 feet up the wall to the point where the ladder rests against the wall).

The handrails of a straight ladder must extend at least 36 inches above the landing.

Straight ladders may not be lashed together to make sectional ladders.

Metal ladders must not be used near electrical conductors.

Workers must use both hands, and must face the ladder when ascending and descending.

No more than one person may use a straight portable ladder at a time.

Standing on the top rung/step or above the manufacturer's safe indication is prohibited.

Ladders should be positioned so workers do not have to lean more than half of their body beyond (outside of) either handrail.

Ladders must not be placed in front of doors that open toward the ladder unless the door is locked and the person(s) using the ladder has the key, the door is blocked open and other persons are warned of the presence of the ladder, or a guard is posted at the door.

Ladders must be inspected after each use and if acceptable, stored in a manner not to damage or stress the ladder. Ideally, ladders should be hung from a side rail in an area where sunlight or extremes in temperature or humidity will not affect them.

Ladders must never be used as scaffolding, storage racks, or shelves. Requirements for construction of portable ladders include:

- Ladders must conform to construction criteria of ANSI Standards A-14.1 and A-14.2.
- Ladders must have at least 12 inches between side rails and should have 12 inches between rungs.
- Ladder length must not exceed 30 feet for single section ladders, 48 feet for two-section ladders, and 60 feet for ladders with more than two sections. The minimum overlap for extension ladders must be 36 inches for up to 36 feet, 48 inches for 36 to 48 feet, and 60 inches for up to 60 feet. There must be positive stops to ensure proper overlap.
- Metal ladders must be of sufficient strength and corrosion resistant.
- Steps or rungs of metal ladders must be treated to prevent slipping.

### **Fixed Ladders**

Fixed ladders shall be constructed and used in accordance with OSHA Standards, 29 CFR 1910.27, and ANSI Standard A-14.3.

#### **Requirements for Construction**

Loading Requirements: A minimum live load capacity of 200 lb. is concentrated at the points of maximum stress. Capacity must be increased in 200-lb increments for each additional person, based on the rate of use and potential for more than one person using a ladder or ladder section at the same time.

Weight of the ladder itself and appurtenances must be considered in designing the railings and fastenings.

Wooden ladders must meet design stress requirements of 29 CFR 1910.25.

Feature Requirements: Metal rungs must be a minimum of 3/4-inch in diameter, except where corrosive atmospheres exist. In corrosive atmospheres, metal rungs must be 1-inch minimum diameter or coated to

prevent corrosion. Wooden rungs must be a minimum of 1 inch in diameter. The distance between rungs, cleats, or steps must be no more than 12 inches. Rungs, cleats, or steps must be uniformly spaced throughout the length of the ladder.

The minimum clear width of rungs, cleats, or steps is 16 inches.

Rungs, cleats or steps, and side rails that may be used for handholds when climbing, must offer adequate gripping surface and be free of splinters, slivers or burrs, and substances that could cause slipping.

Ladders constructed of different metals, which could result in electrolytic action, must incorporate electrolytic protection. Ladders in atmospheres that could affect the integrity of the ladder must be treated to prevent corrosion or deterioration.

Fixed ladders (unless of sufficient height to use caging or a well construction as fall protection) must have as a minimum:

- 15 inches of clearance from the centerline of the rungs to each side.
- 30 to 36 inches from the rungs to any obstruction on the climbing side of the ladder.
- 7 inches between the rungs and any obstruction on the non-climbing side of the ladder.
- grab rails or extensions of side rails reaching a minimum of 40 inches above the landing.
- be oriented so that it is not necessary to step across more than 12 inches to a point of landing through or to the side of the ladder.

Ladders of greater than 20 feet must have cages or other approved fall protection devices. Where cages or wells are used for fall protection, the cage must begin no lower than 7 feet from the "ground" landing, but no higher than 8 feet. Ladders of more than 30 feet must have sections offset with side-accessed landings (minimum dimensions 24 inches wide by 30 inches long) located at least 4 feet below the top of a 30-foot section (or fraction thereof). The distance from the rungs to the cage back on the climbing side must be between 27 and 28 inches, and the width of the cage or well no less than 27 inches. There should be no projections through the cage. Projections in wells may reduce space from rung to projection to no less than 24 inches, and projections must have deflectors for head protection.

Where fall protection is provided by ladder safety systems (body belts or harnesses, lanyards, and braking devices with safety lines or rails), systems must meet the requirements of and be used in accordance with FLD 25 and be compatible with construction of the ladder system.

## **FLD 30 HAZARDOUS MATERIALS USE AND STORAGE**

### **RELATED FLDs**

*FLD 21 – Explosives*

*FLD 31 – Fire Prevention and Protection Planning*

*FLD 32 – Fire Extinguishers Required and Requirements*

*FLD 36 – Welding/Cutting/Burning*

### **Flammable Liquids**

Flammables and oxidizers must be stored in separate non-smoking areas and flammable gases must be stored away from combustible materials.

Flammable liquids shall be stored in approved containers in an approved flammable storage cabinet or 25 feet from any open flame or ignition source in a well-ventilated area.

Fuels shall be separated from oxidizers, and corrosives must be separated from flammables and stored in approved cabinets or properly ventilated store rooms and separated by 25 feet from other storage areas or buildings that contain ignition sources or incompatible materials

Approved grounding and bonding procedures shall be used for transfer of flammable liquids from one container to another, which includes heavy equipment operation.

Areas where flammable liquids are stored or flammable vapors may be released must be evaluated and identified by hazard class, group, and location (division) according to the National Fire Protection Association. Electrical equipment use must conform to NEC codes. All fuels materials are to be secured within a primary and secondary containment and inspected daily for integrity

All tanks and secondary containments, containers, and pumping equipment, portable or stationary, used for the storage or handling of flammable and combustible liquids will be listed by UL or FM, or approved by the Occupational Safety and Health Administration (OSHA).

As a minimum, a 10-lb fire extinguisher appropriate for the type of fire that could occur must be within 75 feet of any accumulation of 5 gallons or more of flammable liquids or gases.

### **Cylinders**

Cylinders must be stored upright and secured to prevent them from falling over. The gas supplier must be consulted prior to storing gas cylinders in other than an upright position.

Cylinder caps must be in place when cylinders are not in use.

Cylinders must be secured with a fire resistant material.

Cylinders should be stored out of direct sunlight.

Cylinders containing fuels (e.g., acetylene) must be separated from oxidizers (e.g., oxygen, carbide) by 20 feet or a 5-foot high fire wall with a minimum 1/2-hour fire resistance rating if outside, or 1-hour resistance rating if inside.

**Explosives**

Explosives must be handled under the direct supervision of a competent person that has demonstrated years of safe experience with the site specific material.

**HAZCOM**

A Hazard Communication program in accordance with 29 CFR 1910.1200 and Weston's Hazard Communication is to be developed and implemented at each work location where hazardous materials are stored and/or used.



## **FLD 32 FIRE EXTINGUISHERS REQUIRED AND REQUIREMENTS**

### **RELATED FLDs**

*FLD 03 – Hot Processes - Steam, Low Temperature, Thermal Treatment Unit, and Transportable Incinerator*

*FLD 21 – Explosives*

*FLD 22 – Heavy Equipment Operation*

*FLD 30 – Hazardous Materials Use and Storage*

*FLD 31 – Fire Prevention and Protection Planning*

*FLD 36 – Welding/Cutting/Burning*

Fire extinguishers are a key component of fire fighting. Small fires that are small can be effectively fought with properly selected and correctly located extinguishers. The Fire Department should be notified as soon as a fire is discovered, and should not be delayed by awaiting the results of the application of portable fire extinguishers.

The successful use of fire extinguishers, according to the National Fire Protection Association (NFPA) Standard 10, depends on the following conditions having been met:

1. The fire extinguisher is properly located and in working order.
2. The fire extinguisher is of the proper type for a fire that can occur.
3. The fire is discovered while still small enough for the fire extinguisher to be effective.
4. The fire is discovered by a person ready, willing, and able to use the fire extinguisher.

To select an appropriate fire extinguisher, the situation must be considered for the type of fires anticipated (based on flammable and/or combustible sources on site), the facility construction, the anticipated hazard level, as well as the ambient air temperature conditions.

### **FIRE TYPES**

To determine the types of fires anticipated on site, NFPA classifies fires by type:

- Class A Fires – Fires in ordinary combustible materials, such as wood, cloth, paper, rubber, and many plastics.
- Class B Fires – Fires in flammable liquids, combustible liquids, petroleum greases, tars, oil-based solvents, lacquers, alcohols, and flammable gases.
- Class C Fires – Fires that involve energized electrical equipment.
- Class D Fires – Fires in combustible metals, such as magnesium, titanium, zirconium, sodium, lithium, and potassium.
- Class K Fires – Fires in cooking appliances that involve combustible cooking media (vegetable or animal oils and fats).

Corresponding to the types of fires, fire extinguishers are labeled to match fire types. Extinguishers suitable for Class A fires should be identified by a triangle containing the letter “A,” and green (if colored). Extinguishers suitable for Class B fires should be identified by a square containing the letter “B,” and red (if colored). Extinguishers suitable for Class C fires should be identified by a circle containing the letter “C,” and blue (if colored). Extinguishers suitable for Class D fires should be identified by a 5-pointed star containing the letter “D,” and yellow (if colored).

## **HAZARD CLASSIFICATION**

NFPA 10 classifies hazards on three levels; Light (Low), Ordinary (Moderate), and Extra (Heavy) Hazards.

### **Light Hazard**

Light (Low) hazard areas constitute locations where the total amount of Class A combustible materials is of minor quantity. This assumes that the majority of the items are either noncombustible or arranged so that fire is not likely to spread rapidly. An example of this hazard level would be an office setting. Small amounts of Class B flammables are included in this hazard level, provided that they are kept in closed containers, and appropriately stored.

### **Ordinary Hazard**

Ordinary (Moderate) hazard areas are locations where the total amount of Class A combustibles and Class B flammables are present in greater amounts than expected in Light hazard areas. Examples of these areas are dining areas, light manufacturing, workshops and support service areas of Light hazard occupancies.

### **Extra Hazard**

Extra (Heavy) hazard areas are locations where the total amount of Class A combustibles and Class B flammables present in storage, production, use, and finished product (or combination thereof) is above areas of Ordinary hazard. These areas include woodworking, vehicle repair, cooking areas, and storage and manufacturing processes.

## **FIRE EXTINGUISHER RATINGS**

The classification and rating system describing fire extinguishers is that of Underwriters Laboratories, Inc. The class ratings correspond to the various fire types (A, B, C, D, and K), and the numerical value in front of the class rating dictates the size of fire it can extinguish. In principle, a 2-A fire extinguisher can extinguish twice as much fire as a 1-A; a 20-A fire extinguisher can extinguish 20 times as much fire. Each class rating has its own extinguishing media and corresponding volume. A 1-A fire extinguisher is the equivalent of 1¼ gallons of water, for reference.

Class B extinguishers can have gallons of foam, pounds of carbon dioxide, or pounds of a dry chemical.

**Note:** A fire extinguisher may be rated to fight the appropriate size fire, but the training and degree of experience of the operator influences this amount.

## **EXTINGUISHER SELECTION**

To select the appropriate number and locations of fire extinguishers throughout a facility, work areas must be evaluated based on a minimum rated single extinguisher (dictated by hazard level), the maximum floor area per unit of Class A hazards, the maximum floor area for the extinguisher, and the maximum distance of travel to the extinguisher.

### Fire Extinguisher Size and Placement for Class A Hazards

Criteria	Light Hazard	Ordinary Hazard	Extra Hazard
Minimum rated single extinguisher	2-A	2-A	4-A
Maximum floor area per unit of Class A hazards	3,000 square feet	1,500 square feet	1,000 square feet
Maximum floor area for extinguisher	11,250 feet	11,250 feet	11,250 feet
Maximum travel distance to extinguisher	75 feet	75 feet	75 feet

### Fire Extinguisher Size and Placement for Class B Hazards

Type of Hazard	Basic Minimum Extinguisher Rating	Maximum Travel Distance to Extinguishers (feet)
Light	5-B	30
	10-B	50
Ordinary	10-B	30
	20-B	50
Heavy	40-B	30
	80-B	50

## INSPECTION

Fire extinguishers shall be inspected when initially placed into service, and every 30 days thereafter. More frequent intervals can be maintained, should the situation require. Inspections should document the following:

1. Location in designated place
2. Obstructions to access or visibility
3. Operating instructions legible (with nameplate facing outwards)
4. Safety seals and tamper indicators intact
5. Fullness determined by weighing ("hefting" is acceptable)
6. Examination for obvious physical damage, corrosion, leakage, and clogged nozzle
7. Pressure gauge in the operable range or position
8. HMIS label in place

## SERVICING

Only trained personnel can perform maintenance, servicing, and recharging of fire extinguishers. Trained personnel will have the appropriate tools, manuals, recharge materials, lubricants, and manufacturer's replacement parts specifically listed for use in the fire extinguisher.

## **PROCEDURE**

Fire extinguishers appropriate in size and classification shall be present, readily accessible, and ready for use in all areas where there is potential for fires.

Fire extinguishers must be used in conjunction with an emergency response or contingency plan.

Health and Safety Plans must identify number, type, and location of all fire extinguishers related to a specific project.

## **FLD 38 HAND AND POWER HAND TOOLS**

### **REFERENCES**

29 CFR 1926 Subpart I

29 CFR 1910 Subpart P

ANSI Standard A10.3-1970, Safety Requirements for Explosive-Actuated Fastening Tools

### **RELATED FLDs**

*FLD 06 – Cold Stress*

*FLD 10 – Manual Lifting and Handling of Heavy Objects*

*FLD 16 – Pressure Systems: Compressed Gas Systems*

*FLD 35 – Electrical Safety*

### **INTRODUCTION**

Injuries from hand tools are often caused by improper use, using the wrong tool for the job, or from using a defective tool. Workers often assume that they know how to use a common hand tool. Working with something other than the simplest non-powered hand tools shall be performed only by those persons competent or qualified through formal training or documented experience.

Like all tools, hand and power tools must be maintained properly for effective use and safety. This Field Operating Procedure describes general safety guidelines for the four major categories of hand tools: cutting tools, torsion tools, impact tools, and power tools.

The use of any machinery, tool, material, or equipment which is not in compliance with any applicable OSHA 1910/1926 requirement is prohibited. Any tools or equipment identified as unsafe or defective will be “tagged or locked-out.” Controls shall be applied rendering the unsafe or defective tool or equipment inoperable. Any damaged or defective equipment shall be removed from its place of operation. Weston shall be responsible for the safe condition of tools and equipment used by employees, including tools and equipment that may be furnished by employees.

Tags shall be used as a means to prevent accidental injury or illness to employees who are exposed to hazardous or potentially hazardous conditions, equipment or operations, which are out of the ordinary, unexpected, or not readily apparent. Tags shall be used until the identified hazard is eliminated or the hazardous operation is completed. Tags need not be used where signs, guarding, or other positive means of protection are being used.

### **GENERAL SAFETY RULES – APPLICABLE TO USE OF ALL TOOLS**

- Tools will be inspected prior to each use. Tools found to be unsafe will be tagged by the inspector “Do Not Use” and either repaired or removed from the site.
- Keep the work area clear of clutter.
- Keep the work area properly illuminated.
- Maintain and keep tools sharpened, oiled, and stored in a safe, dry place.
- Wear ear and eye protection when cutting, sawing, drilling, or grinding.
- Supervisor should instruct everyone using equipment on safe procedures before they use them.
- Inspect tools, cords, and accessories regularly and document any repairs.

- Repair or replace problem equipment immediately.
- Electric power tools must have a 3-wire cord plugged into a grounded receptacle, be double-insulated or powered by a low-voltage isolation transformer, and fitted with guards and safety switches.
- Machine guards must be in-place and not removed during equipment operation.
- Do not alter factory-supplied safety features on tools.
- Install and repair equipment only if you are qualified.
- Use the right tool for the job; for instance, do not use a screwdriver as a chisel or a wrench as a hammer.
- Carry a sharp tool pointed downward or place in a tool belt or toolbox.
- Protect a sharp blade with a shield.
- Store tools in drawers or chests with cutting edge down.
- When using power tools, wear long hair in a protective manner, do not wear jewelry or loose clothing, use safety glasses, respiratory protection, hard hats, etc., as needed/specified by the manufacturer. Note that protective gloves should not be worn when operating powered woodworking tools because of the possibility of the work piece snagging the glove and pulling the hand to the cutting surface.
- All hand-held power-driven tools must be equipped with one of the following: a constant pressure switch that shuts off the power upon release (e.g., circular saws, hand-held power drills, chain saws) or an on-off switch (e.g., routers, planers scrolls saws, jigsaws).
- Never leave a running tool unattended.
- All workers using hand and power tools must be properly trained, and training must be documented.
- Tools of a non-sparking material must be used if fire/explosion hazards exist.
- All fuel-operated tools shall be stopped and allowed to cool prior to being refueled, serviced, or maintained, and proper ventilation provided when used in enclosed spaces.
- Bench grinders shall be properly grounded. Work rests must be kept at a distance not to exceed 1/8 inch from the grinding wheel surface.
- All persons using grinders or abrasive wheels shall use approved eye-protective devices.
- Hand held grinders shall have grinding wheel guards in place during operation.
- Train personnel to recognize that tasks involving lifting, repetitive motion, excess pressure, vibration, awkward positions, and remaining stationary for prolonged periods and work in cold conditions increase the risk of musculoskeletal injury. Procedures for avoiding or minimizing risk include: using mechanical devices for lifting, following procedures in FLD 10 when manual lifting is necessary, using shock absorbing gloves when using vibrating tools, choosing tools that reduce gripping force and align joints in a neutral position or holding tools in an ergonomically neutral position, taking breaks or alternating repetitive jobs, and following procedures in FLD 06.
- Hand tools such as chisels and punches, which develop mushroomed heads during use must be taken out of service and reconditioned by qualified persons or replaced, as necessary.
- Broken or fractured handles on hammers, axes and similar equipment must be replaced promptly.
- Worn or bent wrenches must be replaced.

- Handles designed for use on files and similar tools must be used.
- Jacks must be checked periodically to ensure they are in good operating condition

## **TORSION TOOLS**

Torsion tools are used to grip, fasten, and turn. These include wrenches, pliers, screwdrivers, vises, and clamps. There is a variety of each type of these tools. Selection is very important. Here are a few safety precautions for common torsion tools:

- Wrenches should always be pulled and not pushed. Pushing a wrench can cause a loss of control if there is a sudden release of pressure. A short, steady pull should be used rather than quick, jerky motions. Where available, use a socket wrench instead of an adjustable or open-ended wrench. Socket wrenches are generally easier to control, are more convenient, and are less likely to damage a bolt or nut. When using an adjustable wrench, the pressure should be applied to the fixed jaw
- Pipe wrenches can easily slip on pipes or fittings, causing injury. To prevent slipping, make sure that the pipe or fitting is clean and the wrench jaws are sharp and kept clean of oil and debris.
- Pliers should never be substituted for a wrench. They do not have the same gripping power and can easily slip on a tight object. When using cutting pliers, the object being cut can fly off and cause injury. Wear safety glasses when cutting with pliers.
- Screwdrivers are often misused. They should not be used for prying, or as punches or wedges. These misuses can damage the head of the screwdriver. A dull tip can cause the screwdriver to slip. The tip must be flat at the tip and tapered for a snug fit on the screw.
- When using vises, make sure that the vise is bolted solidly to a base (e.g., work bench). When cutting material in a vise, try to cut as close to the vise as possible to minimize vibration.
- Oil vises regularly.

## **Screwdrivers**

- Most screwdrivers are not designed to be used on electrical equipment. Use an insulated screwdriver.
- Do not hold an object in the palm of one hand and press a screwdriver into it; place the object on a bench or a table.
- Never hammer with a screwdriver.
- Check for broken handles, bent blade, etc.
- Select a screwdriver of the proper size to fit the screw.
- Screwdrivers with a split or splintered handle shall not be used.
- The point shall be kept in proper shape with a file or grinding wheel.
- Screwdrivers shall not be used as a substitute punch, chisel, nail-puller, etc.

## **Pliers**

- Do not use pliers as a substitute for hammers or wrenches.
- Use insulated pliers when doing electrical work.

- Inspect pliers frequently to make certain that they are free of breaks or cracks.
- Pliers shall be kept free from grease and oil and- the teeth or cutting edges shall be kept clean and sharp.
- The fulcrum pin, rivet or bolt shall be snug but not tight.

## **Wrenches**

- Select the correct size of wrench for the job.
- Never use a piece of pipe or another wrench as a wrench handle extension.
- Too much leverage can ruin a tool and cause injury.
- To avoid sudden slips, stand in a balanced position and always pull on the wrench instead of pushing against the fixed jaw.
- Only wrenches in good condition shall be used; a bent wrench, if straightened, has been weakened and shall not be used.
- Watch for sprung jaws on adjustable wrenches.
- Always pull toward yourself, never push, since it is easier to brace against a sudden lunge toward you should the tool slip or break.
- When using a wrench on a tight nut - first use some penetrating oil, use the largest wrench available that fits the nut, when possible pull on the wrench handle rather than pushing, and when possible apply force to the wrench with both hands while both feet are firmly placed. Always assume that you may lose your footing - check the place where you may fall for sharp objects.
- Keep all pipe wrenches clean and in good repair. The jaws of pipe wrenches should be wire brushed frequently to prevent an accumulation of dirt and grease that would otherwise build up and cause wrenches to slip.
- Never use pipe wrenches in place of a rod holding device.
- Replace hook and heel jaws when they become visibly worn.
- Position your hands so that your fingers will not be smashed between the wrench handle and the ground or other work surface; when breaking joints the wrench may slip or the joint may suddenly let go.

## **IMPACT TOOLS**

Impact tools include various types of hammers such as riveting hammers, carpenter's claw hammers, and sledgehammers. The main hazard associated with all these tools is damage to the hands and arms. The following safety procedures should be employed when using hammers:

- The handle shall be securely fitted and suited for the type of job and type of hammerhead. The striking face of the hammer shall be kept well dressed according to the application.
- The handle shall be smooth and free of oil to prevent slippage.
- Safety goggles shall be worn at all times when hammering to protect from flying nails, wood chips, and metal or plastic fragments.



- To properly drive a nail, hold the hammer near the end of the handle and start off with a light blow. Increase power after the nail is set.
- To avoid chipping or spalling of the hammerhead, use the lightest swing possible, hammer straight and not on an angle. Inspect the head of the hammer for potential chipping and spalling.

## **Hammers**

- Use the correct hammer for the type of work to be done.
- Have an unobstructed swing when using a hammer and watch for overhead interference.
- Check for defects before using.
- The head of a hammer shall be wedged securely and squarely on the handle and neither the head nor the handle shall be chipped or broken.

## **CUTTING TOOLS**

The main hazard associated with cutting tools is tool slippage. A dull tool or poor tool technique can cause a slip, which can redirect the cutting part of the tool toward the body. In addition, a sudden release or change in the force applied to a tool can throw the user off balance, possibly falling into another object, which may cause injury. To prevent slippage, tools shall be kept sharp and handled in such a way that, if a slip occurs, the direction of force will be away from the body. In addition, cutting along the grain of a material can help prevent changes in the pressure applied to the tool, thereby preventing slippage.

## **Chisels**

- Always wear safety goggles or a face shield when using a chisel.
- Drive wood chisel outward and away from your body.
- Do not use chisels to pry.
- Keep edges sharp for most effective work and protect when not in use.

## **Knives**

- Always cut away from the body.
- Keep hands and body clear of the knife stroke.
- Use a locking blade knife when possible.
- Keep blades sharp.
  - Knives and other sharp or edged tools must be maintained in proper condition. A sharp edged tool, used properly, is safer than a dull or improperly maintained tool.
  - When not in immediate use edged tools must be properly secured via, sheathing, closing, capping or covering.
  - Any task involving the use of an edged tool must be properly evaluated, alternatives to edged tools reviewed and training in the proper use, maintenance and handling verified by management and/or the site safety officer.
  - Knives, box cutters or like tools will not be authorized for cutting plastic wire ties or tubing. Use appropriately shaped and sized wire cutters or snips.
  - Remove knives from carry on luggage and place in checked baggage.

## **POWERED TOOLS**

- Portable power tools shall be carefully inspected before use and shall be kept repaired.
- Switches and plugs must operate properly, and the cords must be clean and free from defects.
- Portable powered tools capable of receiving guards and/or designed to accommodate guards shall be equipped with guards to prevent the operator from having any part of his body in the danger zone during the operating cycle.
- Electric powered portable tools with exposed conducting parts shall be grounded. Portable tools protected by an approved system of double insulation, or its equivalent, need not be grounded. Where such an approved system is employed, the equipment shall be distinctively marked.
- Hand-held powered tools of a hazardous nature such as circular saws having a blade diameter greater than two inches, chain saws, percussion tools, drills, tappers, fasteners, drivers, grinders with wheels greater than two inches in diameter, disc sanders, belt sanders, reciprocating saws, saber scroll saws and jig saws with blade shanks greater than one-fourth inch, and other similarly operating powered tools shall be equipped with a constant pressure switch or control ("dead-man switch") that will shut the power off when the pressure is released.
- Portable circular saws having a blade diameter over two inches shall be equipped with guards or hoods which will automatically adjust themselves to the work when the saw is in use, so that none of the teeth are exposed to contact above the work. When withdrawn from the work, the guard shall completely cover the saw to at least the depth of the teeth. The saw shall not be used without a shoe or guide.
- Pneumatic powered portable tools shall be equipped with automatic air shut-off valves that stop the tool when the operators hand is no longer in contact with the tool. Safety clips, retainers, or other effective means shall be installed on pneumatic tools to prevent the tools from accidentally misfiring.
- Abrasive wheels with a diameter of more than two inches shall be used only on machines provided with safety guards. The guards shall cover the spindle end, nut, and flange projections. Guards on operations where the work provides a suitable measure of protection to the operator may be so constructed that the spindle end, nut, and other flanges are exposed.
- Explosive-actuated fastening tools' muzzle ends shall have a protective shield or guard designed to confine any flying fragments or particles. The tool shall be so designed that it cannot be fired unless it is equipped with a protective shield or guard. Weston Solutions, Inc. employees are not permitted to use a power-actuated tool until properly trained as prescribed by the manufacturer.

### **Extension Cords**

See FLD 35, Electric Safety, for requirements and procedures for using extension cords.

## **SPECIALTY TOOLS**

### **Pneumatic Powered Tools**

Tools powered by air must be inspected and maintained as described above. Hose or tubing used to deliver air to pneumatic tools must be used as required and according to procedures in FLD 16, Pressure Systems: Compressed Gas Systems.

## **Powder-Actuated Tools**

- Only employees who have been trained in the operation of the particular tool in use shall be allowed to operate a powder-actuated tool.
- Powder-actuated tools shall be tested each day before loading to see that safety devices are in proper working condition. The method of testing shall be in accordance with the manufacturer's recommended procedure.
- Any tool found not in proper working order, or that develops a defect during use, shall be immediately removed from service and not used until properly repaired.
- Personal protective equipment shall be selected in accordance with manufacturer's recommendations and in consideration of the potential hazards of the task.
- Tools shall not be loaded until just prior to the intended firing time. Neither loaded nor empty tools are to be pointed at any employees. Hands shall be kept clear of the open barrel end.
- Loaded tools shall not be left unattended.
- Fasteners shall not be driven into very hard or brittle materials including, but not limited to, cast iron, glazed tile, surface-hardened steel, glass block, live rock, face brick, or hollow tile.
- Driving into materials easily penetrated shall be avoided unless such materials are backed by a substance that will prevent the pin or fastener from passing completely through and creating a flying missile hazard on the other side.
- No fastener shall be driven into a spalled area caused by an unsatisfactory fastening.
- Tools shall not be used in an explosive or flammable atmosphere.
- All tools shall be used with the correct shield, guard, or attachment recommended by the manufacturer.
- Powder-actuated tools used by employees shall meet all other applicable requirements of American National Standards Institute, A10.3-1970, Safety Requirements for Explosive-Actuated Fastening Tools.

## **FLD 39 ILLUMINATION**

### **RELATED FLDs**

*FLD 08 – Confined Space Entry Program*  
*FLD 10 – Manual Lifting and Handling of Heavy Objects*  
*FLD 12 – Housekeeping*  
*FLD 13 – Structural Integrity*  
*FLD 18 – Operation and Use of Boats*  
*FLD 22 – Heavy Equipment Operation*  
*FLD 23 – Cranes, Rigging, and Slings*  
*FLD 33 – Demolition*  
*FLD 38 – Hand and Power Hand Tools*

### **PROCEDURE**

While work is in progress, offices, facilities, access-ways, working areas, construction roads, etc., will be lighted by at least the minimum light intensities specified in Table 1.

Office lighting will be in accordance with American National Standards Institute (ANSI)/ Illuminating Engineering Society of North America (IESNA) RP-1.

Roadway lighting will be in accordance with ANSI/IESNA RP-8.

Marine lighting will be in accordance with ANSI/IESNA RP-12.

### **Means of Egress**

- Means of egress will be illuminated, with emergency and non-emergency lighting, to provide a minimum of 1 footcandle (fc) (lumens per square foot [ $\text{lm}/\text{ft}^2$ ]) (11 lux [lx], measured at the floor. (Reference NFPA 101)
- The illumination will be arranged so that the failure of any single lighting unit, including the burning out of an electric bulb, will not leave any area in total darkness.

Lamps and fixtures will be guarded and secured to preclude injury to personnel. Open fluorescent fixtures will be provided with wire guards, lenses, tube guards and locks, or safety sockets that require force in the horizontal axis to remove the lamp.

Lamps for general illumination shall be protected from accidental contact or breakage. Protection shall be provided by elevation of at least 7 ft (2.1 m) from normal working surface or suitable fixture or lamp holder with a guard.

**TABLE 1 - MINIMUM LIGHTING REQUIREMENTS**

<b>Facility or Function</b>	<b>Illuminance – lx (lm/ft<sup>2</sup>)</b>
Accessways	
– general indoor	55 (5)
– general outdoor	33 (3)
– exitways, walkways, ladders, stairs	110 (10)
Administrative areas (offices, drafting/meeting rooms, etc.)	540 (50)
Chemical laboratories	540 (50)
Construction Areas	
– general indoor	55 (5)
– general outdoor	33 (3)
– tunnels and general underground work areas, (minimum 110 lx required at tunnel and shaft heading during drilling, mucking, and scaling)	55 (5)
Conveyor routes	110 (10)
Docks and loading platforms	33 (3)
Elevators (freight and passenger)	215 (20)
First-aid stations and infirmaries	325 (30)
Maintenance/Operating Areas/Shops	
– vehicle maintenance shop	325 (30)
– carpentry shop	110 (10)
– outdoors field maintenance area	55 (5)
– refueling area, outdoors	55 (5)
– shops, fine detail work	540 (50)
– shops, medium detail work	325 (30)
– welding shop	325 (30)
Mechanical/electrical equipment rooms	110 (10)
Parking areas	33 (3)
Toilets, wash, and dressing rooms	110 (10)
Visitor areas	215 (20)
Warehouses and Storage Rooms/Areas	
– indoor stockroom, active/bulk storage	110 (10)
– indoor stockroom, inactive	55 (5)
– indoor rack storage	270 (25)
– outdoor storage	33 (3)
Work areas – general (not listed above)	325 (30)

## **FLD 43A      ANIMALS**

Animals represent hazards because of their poisons or venoms, size and aggressiveness, diseases transmitted, or the insects they may carry.

### **Feral Animals**

Landfills and abandoned buildings often attract stray or abandoned dogs. These animals often become pack-oriented, very aggressive, and represent serious risk of harm to unprotected workers.

Workers entering abandoned buildings should be alert for such animals and avoid approaching them since this may provoke aggressive behavior. Avoidance and protection protocols include watching for animal dens, using good housekeeping, and using repellents.

### **Dangerous Wild Animals**

Work in remote areas inhabited by wild animals that have been known to cause injury and kill human beings, requires that companies working in these areas carefully plan for wildlife encounters. This FLD outlines actions that, when properly implemented, should provide a high degree of protection for WESTON employees and wildlife.

See Wildlife Hazard Recognition and Protection Procedure (**Attached**).

### **Venomous Snakes and Lizards**

#### Venomous Shakes

Venomous snakes are common around the world. The major variables are the likelihood of encounter and the snake that is likely to be encountered. Encounters with snakes may be caused by moving containers, reaching into holes, or just walking through high grass, swampy areas, or rocks. **Do not attempt to catch any snakes.**

Symptom of venomous snake bites:

- Bloody wound discharge, blurred vision, burning, convulsions, diarrhea, dizziness, excessive sweating, fainting, fang marks in the skin, fever, increased thirst, local tissue death, loss of muscle coordination, nausea and vomiting, numbness and tingling, rapid pulse, severe pain, skin discoloration, swelling at the site of the bite, weakness.

Venom from venomous snakes and lizards can be divided into three types of toxins, however, there are some indications that snake venom may have more than one toxin and characteristics may change as a snake ages. The three types of toxins and their effects are:

**Hemotoxins** destroy blood cells and affect the circulatory system. The site of the bite rapidly becomes swollen, discolored, and painful. This is usually accompanied by swelling, discoloration, and pain progressing toward the heart.

**Neurotoxins** affect the nervous system and symptoms vary from foggy vision, dizziness, and other comparatively mild symptoms to rigid or flaccid paralysis, shortness of breath, weakness or paralysis of the lower limbs, double vision, inability to speak or swallow, drooping eyelids, and involuntary tremors of the facial muscles. Death can occur in as little as ten minutes, usually due to abrupt cessation of respiration.

**Myotoxins** destroy cells and cause muscle necrosis.

In the US, with the exception of the coral snakes which tend to have neuron-toxic venom, most venomous snakes have been categorized as having hemotoxic venom (in some areas Mojave rattlesnakes are found to have neuron-toxic venom). There is some indication that some species of rattlesnakes have both hemotoxic and neuron-toxic venom. It is also reported that venom of younger snakes may be more neuron-toxic

There are many highly venomous snakes worldwide, some are deadly and most can be deadly without proper care.

## **Lizards**

There are two lizards recognized as venomous, the Gila monster and the Mexican Beaded Lizard. Venom of the Gila monster is considered to be neuron-toxic and that of the Mexican Beaded Lizard is considered to be hemo-toxic.

## **Geographical Listing of Venomous Snakes and Lizards**

Following is a list of poisonous snakes and lizards by geographic area. This list is extensive but may not be all inclusive. In planning for work around the world, also contact local agencies to determine whether there may be additional venomous snakes or lizards.

### **North America (including Mexico)**

**Copperheads** (Broad-banded, Northern, Osage, Southern, Trans-Pecos)

**Rattlesnakes** (Banded rock, Black-tailed, Canebrake, Diamondback [eastern and western], Massasauga (eastern and western), Mojave, Mottled rock, Pacific (northern and southern), Pigmy (southeastern and western), Prairie, Red diamond, Ridge-nosed, Sidewinder, Speckled, Tiger, Timber, Twin-spotted)

**Coral Snake** (Arizona, Eastern, Texas, Western (red bands touching yellow “bad fellow”)

**Cottonmouth or water moccasin** (Eastern, Florida, Western)

### **North America - Lizards**

Gila Monster

## **Central and South America – Venomous Snakes**

Bushmaster, Eyelash Pit Viper, Fer-de-lance, Jumping Viper, Tropical Rattlesnake

## **Central and South America – Venomous Lizards**

Mexican Beaded Lizard

## **Europe**

Common Adder, Long-Nosed Adder, Pallas Viper, Ursini Viper

## **Venomous Snakes of Africa and Asia**

Boomslang, Bush Viper, Common Cobra, Egyptian Cobra, Gaboon Viper, Green Mamba, Green Tree Pit Viper, Habu Pit Viper, Horned Desert Viper, King Cobra, Krait, Levant Viper, Malayan Pit Viper, McMahon's Viper, Mole Viper or Burrowing Viper, Palestinian Viper, Puff Adder, Rhinoceros Viper or River Jack, Russel's Viper, Sand Viper, Saw-Scaled Viper, Wagler's Pit Viper or Temple Viper,

## **Australasia**

Australian Copperhead, Death Adder, Taipan, Tiger Snake,

Poisonous Sea Snakes

Banded Sea Snake, Yellow-bellied Sea Snake

## **Prevention of Bites**

Key factors to working safely in areas where snakes or lizards may be encountered include:

- Be alert
- Use care when reaching into or moving containers
- Use sticks or long-handled tools when reaching where you cannot see
- Be familiar with the habits and habitats of snakes in the vicinity of an incident or site
- In areas or activities where encounters with snakes are likely, wear sturdy leather or rubber work boots and snake chaps
- Do not attempt to catch snakes unless required and qualified

A snake bite warrants medical attention after administration of proper first-aid procedures. It is important to contact local medical facilities to determine where anti-venoms are located.

## **First-Aid**

1. Keep the person calm. Restrict movement, and keep the affected area below heart level to reduce the flow of venom.



2. Remove any rings or constricting items because the affected area may swell. Create a loose splint to help restrict movement of the area.
3. If the area of the bite begins to swell and change color, the snake was probably venomous.
4. Monitor the person's vital signs -- temperature, pulse, rate of breathing, and blood pressure if possible. If there are signs of shock (such as paleness), lay the person flat, raise the feet about a foot, and cover the person with a blanket.
5. Get medical help immediately.
6. Try to photograph or identify the snake. Do not waste time hunting for the snake, and do not risk another bite. Be careful of the head of a dead snake. A snake can actually bite for up to an hour after it is dead (from a reflex).
  - DO NOT allow the person to become over-exerted. If necessary, carry the person to safety.
  - DO NOT apply a tourniquet.
  - DO NOT apply cold compresses to a snake bite.
  - DO NOT cut into a snake bite with a knife or razor.
  - DO NOT try to suction the venom by mouth.
  - DO NOT give stimulants or pain medications unless instructed to do so by a doctor.
  - DO NOT give the person anything by mouth.
  - DO NOT raise the site of the bite above the level of the person's heart
  - Transport the victim to medical attention immediately

## **Animal Borne Diseases**

### **Rabies**

Animal borne diseases include rabies (generally found in dogs, skunks, raccoons, bats, and foxes). Rabies varies from area to area as do the animals most likely to be rabid.

### **Questions and Answers about Rabies**

*Q. What is Rabies and how is it transmitted?*

A. Rabies is a viral infection most often transmitted by bites of animals infected with the virus.

*Q. What animals are most likely to be infected?*

A. Skunks, raccoons, foxes, and bats are wild animals most frequently found to be infected with rabies; however, any warm blooded animal can be infected. Squirrels, groundhogs, horses, cattle, and rabbits have been tested positive for rabies. Dogs and cats are frequently rabies-infected if not immunized.

*Q. How can you tell if an animal is rabies-infected?*

A. Rabies infection is not always apparent. Signs to look for in wild animals are over-aggressiveness or passivity. Spotting animals which are normally nocturnal (active at night) during the day and being able to approach them would be an example of unusual behavior. Finding a bat alive and on the ground is abnormal. The best precaution, however, is to observe wild animals from a safe distance, even if they are injured. Avoid dogs and cats that you do not know.

*Q. What should you do if bitten by an animal you suspect is infected with rabies?*

A. As quickly as possible, wash the bite area with soap and water, then disinfect with 70% alcohol and seek medical attention for follow-up. Try to capture the animal. Avoid being bitten again or contacting the mouth or any saliva of the animal. Keep the animal under surveillance and call the police for assistance to capture it. Have the animal tested.

A dead animal believed to be infected should be preserved and tested for rabies. Health departments are often sources where information can be found regarding testing.

*Q. Is there a cure for rabies?*

A. Rabies is preventable, even after being bitten, if treatment is begun soon enough. Getting prompt medical attention and confirming the rabies infection of an animal are very important. **Rabies is not curable once symptoms or signs of rabies appear.**

There are vaccines available that should be considered if a work assignment involves trapping animals likely to carry rabies. Medical consultants must be involved in decisions to immunize workers against rabies.

## **Hantavirus**

WESTON employees or contractors/subcontractors conducting field work in areas where there is evidence of a rodent population should be aware of an increased level of concern regarding the transmission of “Hantavirus”-associated diseases. Hantavirus is associated with rodents, especially the deer mouse (*Peromyscus maniculans*) as a primary reservoir host. Hantavirus has resulted in several deaths in the U.S.

The Hantavirus can be transmitted by infected rodents through their saliva, urine, and feces. Human infection may occur when infected wastes are inhaled as a result of aerosols produced directly from the animals. They also may come from dried materials introduced into broken skin or onto mucous membranes. Infections in humans occur most in adults and are associated with activities that provide contact with infected rodents in rural/semi-rural areas. Hantavirus begins with one or more flu-like symptoms (i.e., fever, muscle aches, headache, and/or cough) and progresses rapidly to severe lung disease. Early diagnosis and treatment are vital.

## **Prevention**

Personnel involved in work areas where rodents and the presence of the Hantavirus are known or suspected will need to take personal protective measures and to develop an expanded site safety plan.

Field personnel involved in trapping or contacting rodents or their waste products will need to wear respirators with high-efficiency particulate air (HEPA) filters, eye protection, Tyvek coveralls, chemical-resistant gloves, and disposable boot covers. Strict decontamination requirements are needed. Double-bag, label, and specific handling, packaging, shipping, storage, and analytical procedures are required to minimize the risks of exposure from collected mice. More detailed procedures can be obtained from WESTON Corporate Health and Safety.

For employees and facilities in rural/semi-rural areas, the following risk-reduction strategies are appropriate:

- Eliminate rodents and reduce availability of food sources and nesting sites used by rodents.
- Store trash/garbage in rodent-proof metal or thick plastic containers with tight lids.
- Cut all grass/underbrush in proximity to buildings.
- Prevent rodents from entering buildings (e.g., use steel wool, screen, etc., to eliminate openings).

## **Plague**

Described under Insects (Fleas)

## **Anthrax**

Anthrax is an acute infectious disease caused by the spore-forming bacterium *Bacillus anthracis*. Anthrax most commonly occurs in wild and domestic lower vertebrates (cattle, sheep, goats, camels, antelopes, and other herbivores), but it can also occur in humans when they are exposed to infected animals or tissue from infected animals.

Anthrax is most common in agricultural regions where it occurs in animals. These include South and Central America, Southern and Eastern Europe, Asia, Africa, the Caribbean, and the Middle East. When anthrax affects humans, it is usually due to an occupational exposure to infected animals or their products. Workers who are exposed to dead animals and animal products from other countries where anthrax is more common may become infected with *B. anthracis* (industrial anthrax). Anthrax in wild livestock has occurred in the U.S.

Anthrax infection can occur in three forms: cutaneous (skin), inhalation, and gastrointestinal. *B. anthracis* spores can live in the soil for many years, and humans can become infected with anthrax by handling products from infected animals or by inhaling anthrax spores from

contaminated animal products. Anthrax can also be spread by eating undercooked meat from infected animals. It is rare to find infected animals in the U.S.

***Cutaneous:*** Most (about 95%) anthrax infections occur when the bacterium enters a cut or abrasion on the skin, such as when handling contaminated wool, hides, leather, or hair products (especially goat hair) of infected animals. Skin infection begins as a raised itchy bump that resembles an insect bite but within 1-2 days develops into a vesicle and then a painless ulcer, usually 1-3 cm in diameter, with a characteristic black necrotic (dying) area in the center. Lymph glands in the adjacent area may swell. About 20% of untreated cases of cutaneous anthrax will result in death. Deaths are rare with appropriate antimicrobial therapy.

***Inhalation:*** Initial symptoms may resemble a common cold. After several days, the symptoms may progress to severe breathing problems and shock. Inhalation anthrax is usually fatal.

***Intestinal:*** The intestinal disease form of anthrax may follow the consumption of contaminated meat and is characterized by an acute inflammation of the intestinal tract. Initial signs of nausea, loss of appetite, vomiting, and fever are followed by abdominal pain, vomiting of blood, and severe diarrhea. Intestinal anthrax results in death in 25% to 60% of cases.

Anthrax is not known to spread from one person to another person. Communicability is not a concern in managing or visiting patients with inhalation anthrax.

## **Prevention**

In countries where anthrax is common and vaccination levels of animal herds are low, humans should avoid contact with livestock and animal products and avoid eating meat that has not been properly slaughtered and cooked. Also, an anthrax vaccine has been licensed for use in humans. The vaccine is reported to be 93% effective in protecting against anthrax.

Doctors can prescribe effective antibiotics. To be effective, treatment should be initiated early. If left untreated, the disease can be fatal.

Direct person-to-person spread of anthrax is extremely unlikely; however, a patient's clothing and body may be contaminated with anthrax spores. Effective decontamination of people can be accomplished by a thorough wash down with anti-microbe effective soap and water. Waste water should be treated with bleach or other anti-microbial agent. Effective decontamination of articles can be accomplished by boiling contaminated articles in water for 30 minutes or longer and using common disinfectants. Chlorine is effective in destroying spores and vegetative cells on surfaces. Burning the clothing is also effective. After decontamination, there is no need to immunize, treat, or isolate contacts of people ill with anthrax unless they also were also exposed to the same source of infection. Early antibiotic treatment of anthrax is essential—delay seriously lessens chances for survival. Treatment for anthrax infection and other bacterial infections includes large doses of intravenous and oral antibiotics, such as fluoroquinolones, like ciprofloxacin (cipro), doxycycline, erythromycin, vancomycin, or penicillin. In possible cases of inhalation anthrax exposure to unvaccinated personnel, early antibiotic prophylaxis treatment is crucial to prevent possible death.

No skin, especially if it has any wounds or scratches, should be exposed. Disposable personal protective equipment is preferable, but if not available, decontamination can be achieved by washing any exposed equipment in hot water, bleach and detergent. Disposable personal protective equipment and filters should be burned and buried. The size of *Bacillus anthracis* bacilli ranges from 0.5 µm to 5.0 µm. Anyone working with anthrax in a suspected or confirmed victim should wear respiratory equipment capable of filtering this size of particle or smaller. The U.S. National Institute for Occupational Safety and Health (NIOSH) and Mine Safety and Health Administration (MSHA) approved high efficiency-respirator, such as a half-face disposable respirator with a HEPA filter, is recommended. All possibly contaminated bedding or clothing should be isolated in double plastic bags and treated as possible bio-hazard waste. Dead victims that are opened and not burned provide an ideal source of anthrax spores; the victim should be sealed in an airtight body bag. Cremating victims is the preferred way of handling body disposal. No embalming or autopsy should be attempted without a fully equipped biohazard lab and trained and knowledgeable personnel.

Delays of only a few days may make the disease untreatable and treatment should be started even without symptoms if possible contamination or exposure is suspected. Animals with anthrax often just die without any apparent symptoms. Initial symptoms may resemble a common cold – sore throat, mild fever, muscle aches and malaise. After a few days, the symptoms may progress to severe breathing problems and shock and ultimately death. Death can occur from about two days to a month after exposure with deaths apparently peaking at about 8 days after exposure. <sup>[8]</sup> Antibiotic-resistant strains of anthrax are known.

Aerial spores can be trapped by a simple HEPA or P100 filter. Inhalation of anthrax spores can be prevented with a full-face mask using appropriate filtration. Unbroken skin can be decontaminated by washing with simple soap and water. All of these procedures do not kill the spores which are very hard to kill and require extensive treatment to eradicate them. Filters, clothes, etc. exposed to possible anthrax contaminated environments should be treated with chemicals or destroyed by fire to minimize the possibility of spreading the contamination.

In recent years there have been many attempts to develop new drugs against anthrax; but the existing supply still works fine if treatment is started soon enough.

Prevention can also be accomplished through early detection. In response to the U.S. Postal Service (USPS) anthrax attacks of October 2001, the USPS has installed BioDetection Systems (BDS) in their large-scale mail cancellation facilities. BDS response plans have been formulated by the USPS in conjunction with local responders including fire, police, hospitals, and public health. Employees of these facilities have been educated about anthrax, response actions and prophylactic medication. Because of the time delay inherent in getting final verification that anthrax has been used, prophylactic antibiotics for possibly exposed personnel should commence as soon as possible.

The ultimate in prevention is vaccination against infection but this has to be done well in advance of exposure.

Anthrax spores can survive for long periods of time in the environment after release. Methods for cleaning anthrax contaminated sites commonly use oxidizing agents such as peroxides, ethylene Oxide, Sandia Foam, chlorine dioxide (used in the Hart Senate office building), and liquid bleach products containing sodium hypochlorite. These agents slowly destroy bacterial spores. A bleach solution for treating hard surfaces has been approved by the EPA and can be prepared by mixing one part bleach (5.25%-6.00%) to one part white vinegar to eight parts water. Bleach and vinegar must not be combined together directly, rather some water must first be added to the bleach (e.g., two cups water to one cup of bleach), then vinegar (e.g., one cup), and then the rest of the water (e.g., six cups). The pH of the solution should be tested with a paper test strip; and treated surfaces must remain in contact with the bleach solution for 60 minutes (repeated applications will be necessary to keep the surfaces wet).

Chlorine dioxide has emerged as the preferred biocide against anthrax-contaminated sites, having been employed in the treatment of numerous government buildings over the past decade. Its chief drawback is the need for in situ processes to have the reactant on demand.

To speed the process, trace amounts of a non-toxic catalyst composed of iron and tetro-amido macrocyclic ligands are combined with sodium carbonate and bicarbonate and converted into a spray. The spray formula is applied to an infested area and is followed by another spray containing tertiary-butyl hydroperoxide

Using the catalyst method, a complete destruction of all anthrax spores takes 30 minutes. A standard catalyst-free spray destroys fewer than half the spores in the same amount of time. They can be heated, exposed to the harshest chemicals, and they do not easily die.

## **Brucellosis**

Brucellosis, also called undulant fever or Malta fever, is a zoonosis (infectious disease transmitted from animals to humans) caused by bacteria of the genus *Brucella*. It is primarily a disease of domestic animals (goats, pigs, cattle, dogs, etc.) and humans and has a worldwide distribution.

Although brucellosis can be found worldwide, it is more common in countries that do not have good standardized and effective public health and domestic animal health programs. Areas currently listed as high risk are the Mediterranean Basin (Portugal, Spain, Southern France, Italy, Greece, Turkey, North Africa), South and Central America, Eastern Europe, Asia, Africa, the Caribbean, and the Middle East.

The disease is transmitted either through contaminated or untreated milk (and its derivatives) or through direct contact with infected animals, which may include dogs, pigs, camels, and ruminants, primarily sheep, goats, cattle, and bison. This also includes contact with their carcasses.

Leftovers from parturition are also extremely rich in highly virulent brucellae. Brucellae, along with leptospira have the unique property of being able to penetrate through intact human skin, so infection by mere hand contact with infectious material is likely to occur.

The disease is now usually associated with the consumption of un-pasteurized milk and soft cheeses made from the milk of infected animals and with occupational exposure of veterinarians and slaughterhouse workers. Some vaccines used in livestock, most notably *B. abortus* strain 19 also cause disease in humans if accidentally injected. Problems with vaccine induced cases in the United States declined after the release of the RB-51 strain developed in the 1990s and the relaxation of laws requiring vaccination of cattle in many states.

The incubation period of brucellosis is, usually, of one to three weeks, but some rare instances may take several months to surface.

Brucellosis induces inconstant fevers, sweating, weakness, anemia, headaches, depression and muscular and bodily pain.

The symptoms are like those associated with many other febrile diseases, but with emphasis on muscular pain and sweating. The duration of the disease can vary from a few weeks to many months or even years. In first stage of the disease, septicaemia occurs and leads to the classic triad of undulant fevers, sweating (often with characteristic smell, likened to wet hay) and migratory arthralgia and myalgia.

## **Prevention**

The main way of preventing brucellosis is by using fastidious hygiene in producing raw milk products, or by pasteurization of all milk that is to be ingested by human beings, either in its pure form or as a derivate, such as cheese.

Provide protection from skin contact when handling potentially infected animals.

## **Q fever**

**Q fever** is caused by infection with *Coxiella burnetii*. This organism is uncommon but may be found in cattle, sheep, goats and other domestic mammals, including cats and dogs. The infection results from inhalation of contaminated particles in the air, and from contact with the vaginal mucus, milk, feces, urine or semen of infected animals. The incubation period is 9-40 days. It is considered possibly the most infectious disease in the world, as a human being can be infected by a single bacterium.

The most common manifestation is flu-like symptoms with abrupt onset of fever, malaise, profuse perspiration, severe headache, myalgia (muscle pain), joint pain, loss of appetite, upper respiratory problems, dry cough, pleuritic pain, chills, confusion and gastro-intestinal symptoms such as nausea, vomiting and diarrhea. The fever lasts approximately 7-14 days.

During the course, the disease can progress to an atypical pneumonia, which can result in a life threatening acute respiratory distress syndrome (ARDS), whereby such symptoms usually occur during the first 4-5 days of infection.

Less often the Q fever causes (granulomatous) hepatitis which becomes symptomatic with malaise, fever, liver enlargement (hepatomegaly), pain in the right upper quadrant of the abdomen and jaundice (icterus).

The chronic form of the Q fever is virtually identical with the inflammation of the inner lining of the heart (endocarditis), which can occur after months or decades following the infection. It is usually deadly if untreated. However, with appropriate treatment this lethality is around 10%.

The pathogenic agent is to be found everywhere except Antarctica and New Zealand. In Europe it appears as hepatitis rather than pneumonia as in the United States. The common way of infection is inhalation of contaminated dust, contact with contaminated milk, meat, wool and particularly birthing products. Ticks can transfer the pathogenic agent to other animals. Transfer between humans seems extremely rare and has so far been described in very few cases.

## **Prevention**

Q fever is effectively prevented by intradermal vaccination with a vaccine composed of killed *Coxiella burnetii* organisms. Skin and blood tests should be done before vaccination to identify preexisting immunity; the reason is that vaccinating subjects who already have immunity can result in a severe local reaction. After a single dose of vaccine, protective immunity lasts for many years. Revaccination is not generally required. Annual screening is typically recommended.

Wear appropriate PPE when handling potentially infected animals or materials.

## **Leptospirosis**

Leptospirosis is a bacterial disease that affects humans and animals. It is caused by bacteria of the genus *Leptospira*.

The time between a person's exposure to a contaminated source and becoming sick is 2 days to 4 weeks. Illness usually begins abruptly with fever and other symptoms. Leptospirosis may occur in two phases; after the first phase, with fever, chills, headache, muscle aches, vomiting, or diarrhea, the patient may recover for a time but become ill again. If a second phase occurs, it is more severe; the person may have kidney or liver failure or meningitis. This phase is also called Weil's disease.

The illness lasts from a few days to 3 weeks or longer. Without treatment, recovery may take several months. In rare cases death occurs.

Many of these symptoms can be mistaken for other diseases. Leptospirosis is confirmed by laboratory testing of a blood or urine sample.

*Leptospira* organisms have been found in cattle, pigs, horses, dogs, rodents, and wild animals. Humans become infected through contact with water, food, or soil containing waste from these infected animals. This may happen by consuming contaminated food or water or through skin



contact, especially with mucosal surfaces, such as the eyes or nose, or with broken skin. The disease is not known to be spread from person to person.

Leptospirosis occurs worldwide but is most common in temperate or tropical climates. It is an occupational hazard for many people who work outdoors or with animals, for example, farmers, sewer workers, veterinarians, fish workers, dairy farmers, or military personnel. It is a recreational hazard for campers or those who participate in outdoor sports in contaminated areas and has been associated with swimming, wading, and whitewater rafting in contaminated lakes and rivers. The incidence is also increasing among urban children.

The risk of acquiring leptospirosis can be greatly reduced by not swimming or wading in water that might be contaminated with animal urine.

Protective clothing or footwear should be worn by those exposed to contaminated water or soil because of their job or recreational activities.

### **Prevention**

Avoid risky foods and drinks.

Buy it bottled or bring it to a rolling boil for 1 minute before drink it. Bottled carbonated water is safer than non-carbonated water.

Ask for drinks without ice unless the ice is made from bottled or boiled water. Avoid popsicles and flavored ices that may have been made with contaminated water.

Eat foods that have been thoroughly cooked and that are still hot and steaming

Avoid raw vegetables and fruits that cannot be peeled. Vegetables like lettuce are easily contaminated and are very hard to wash well. When eating raw fruit or vegetables that can be peeled, peel them yourself. (Wash your hands with soap first.) Do not eat the peelings.

Avoid foods and beverages from street vendors. It is difficult for food to be kept clean on the street, and many travelers get sick from food bought from street vendors.

Leptospirosis is treated with antibiotics, such as doxycycline or penicillin, which should be given early in the course of the disease. Intravenous antibiotics may be required for persons with more severe symptoms. Persons with symptoms suggestive of leptospirosis should contact a health care provider.

### **Machupo virus**

**Machupo virus, Bolivian hemorrhagic fever (BHF)**, also known as **black typhus** is a hemorrhagic fever and zoonotic infectious disease occurring in Bolivia. First identified in 1959, black typhus is caused by infection with machupo virus, a negative single-stranded RNA virus of the arenaviridae family. The infection has a slow onset with fever, malaise, headache and muscular pains. Petechiae (blood spots) on the upper body and bleeding from the nose and gums

are observed when the disease progresses to the hemorrhagic phase, usually within seven days of onset. The mortality rate is estimated at 5 to 30 percent.

The vector is the vesper mouse (*Calomys callosus*), a rodent indigenous to northern Bolivia. Infected animals are asymptomatic and shed virus in excretions, by which humans are infected. Evidence of person-to-person transmission of Machupo virus exists but is believed to be rare (Kilgore, et. al, 1995).

Measures to reduce contact between the vesper mouse and humans have effectively limited the number of outbreaks, with no cases identified between 1973 and 1994. A vaccine being developed for the genetically related Junín virus which causes Argentine hemorrhagic fever has shown evidence of cross-reactivity with Machupo virus and may be an effective prophylactic measure for people at high risk of infection.

## **Prevention**

Appropriate PPE including respiratory protection for handling animals or when there is potential exposure to wastes from the animals.

## **Ebola**

Ebola is both the common term used to describe a group of viruses belonging to genus Ebolavirus, family Filoviridae, and the common name for the disease which they cause, Ebola hemorrhagic fever. Ebola viruses are morphologically similar to the Marburg virus, also in the family Filoviridae, and share similar disease symptoms. Ebola has caused a number of serious and highly publicized outbreaks since its discovery.

It is known to be a zoonotic virus as it is currently devastating the populations of lowland gorillas in Central Africa. Despite considerable effort by the World Health Organization, no animal **reservoir** capable of sustaining the virus between outbreaks has been identified. However, it has been hypothesized that the most likely candidate is the fruit bat.

Ebola hemorrhagic fever is potentially lethal and encompasses a range of symptoms including fever, vomiting, diarrhea, generalized pain or malaise, and sometimes internal and external bleeding. Mortality rates are extremely high, with the human case-fatality rate ranging from 50% - 89%, according to viral subtype. <sup>[2]</sup> The cause of death is usually due to hypovolemic shock or organ failure.

Because Ebola is potentially lethal and since no approved vaccine or treatment is available, Ebola is classified as a biosafety level 4 agent, as well as a Category A bioterrorism agent by the Centers for Disease Control and Prevention.

Symptoms are varied and often appear suddenly. Initial symptoms include high fever (at least 38.8°C), severe headache, muscle joint, or abdominal pain, severe weakness and exhaustion, sore throat, nausea, and dizziness. Before an outbreak is suspected, these early symptoms are easily

mistaken for malaria, typhoid fever, dysentery, influenza, or various bacterial infections, which are all far more common and less reliably fatal.

Ebola may progress to cause more serious symptoms, such as diarrhea, dark or bloody feces, vomiting blood, red eyes due to distention and hemorrhage of sclerotic arterioles, petechia, maculopapular rash, and purpura. Other secondary symptoms include hypotension (less than 90 mm Hg systolic /60 mm Hg diastolic), hypovolemia, tachycardia, organ damage (especially the kidneys, spleen, and liver) as a result of disseminated systemic necrosis, and proteinuria. The interior bleeding is caused by a chemical reaction between the virus and the platelets which creates a chemical that will cut cell sized holes into the capillary walls.

Among humans, the virus is transmitted by direct contact with infected body fluids, or to a lesser extent, skin or mucus membrane contact. The incubation period can be anywhere from 2 to 21 days, but is generally between 5 and 10 days.

Although airborne transmission between monkeys has been demonstrated by an accidental outbreak in a laboratory located in Virginia, USA, there is very limited evidence for human-to-human airborne transmission in any reported epidemics.

The infection of human cases with Ebola virus has been documented through the handling of infected chimpanzees, gorillas, and forest antelopes--both dead and alive--as was documented in Côte d'Ivoire, the Republic of Congo and Gabon. The transmission of the Ebola Reston strain through the handling of cynomolgus monkeys has also been reported.<sup>[7]</sup>

So far, all epidemics of Ebola have occurred in sub-optimal hospital conditions, where practices of basic hygiene and sanitation are often either luxuries or unknown to caretakers and where disposable needles and autoclaves are unavailable or too expensive. In modern hospitals with disposable needles and knowledge of basic hygiene and barrier nursing techniques, Ebola rarely spreads on such a large scale.

## **Prevention**

Prevention methods include good hygiene in medical settings and awareness of the virus in travel areas. There is no known effective vaccine for humans.

Prevention efforts should concentrate on avoiding contact with host or vector species. Travelers should not visit locations where an outbreak is occurring. Contact with rodents should be avoided. Minimize exposure to arthropod bites by using permethrin-impregnated bed nets and insect repellents.

Strict compliance with infection control precautions (i.e., use of disposable gloves, face shields, and disposable gowns to prevent direct contact with body fluids and splashes to mucous membranes when caring for patients or handling clinical specimens; appropriate use and disposal of sharp instruments; hand washing and use of disinfectants) is recommended to avoid health care-associated infections.

Contact with dead primates should be avoided.

## **Marburg Virus**

The **Marburg virus** is the causative agent of **Marburg hemorrhagic fever**. Both the disease and virus are related to Ebola and originate in Uganda and Eastern Congo. The zoonosis is of unknown origin, but fruit bats are suspected. In the spring of 2005, there was an outbreak in Angola.

Because many of the signs and symptoms of Marburg hemorrhagic fever are similar to those of other infectious diseases, such as malaria or typhoid, diagnosis of the disease can be difficult, especially if only a single case is involved.

The disease is spread through bodily fluids, including blood, excrement, saliva, and vomit.

Early symptoms are often non-specific, and usually include fever, headache and myalgia after an incubation period of 3-9 days. After five days, a macropapular rash is often present on the trunk. Later-stage Marburg infection is acute and can include jaundice, pancreatitis, weight loss, delirium and neuropsychiatric symptoms, hemorrhaging, hypovolemic shock and multi-organ dysfunction with liver failure most common.

Accounts of external hemorrhaging from bodily orifices are in fact rare. Time course varies but symptoms usually last for one to three weeks until the disease either resolves or kills the infected host. The fatality rate is between 23-90%.

## **Prevention**

Prevention methods include good hygiene in medical settings and awareness of the virus in travel areas. There is no known effective vaccine for humans.

Prevention efforts should concentrate on avoiding contact with host or vector species. Travelers should not visit locations where an outbreak is occurring. Contact with rodents should be avoided. Minimize exposure to arthropod bites by using permethrin-impregnated bed nets and insect repellents.

Strict compliance with infection control precautions (i.e., use of disposable gloves, face shields, and disposable gowns to prevent direct contact with body fluids and splashes to mucous membranes when caring for patients or handling clinical specimens; appropriate use and disposal of sharp instruments; hand washing and use of disinfectants) is recommended to avoid health care-associated infections.

Contact with dead primates should be avoided.

## **Rift Valley Fever.**

Rift Valley Fever (RVF) is a viral Zoonosis affects primarily domestic livestock, but can be passed to humans) causing fever. It is spread by the bite of infected mosquitoes. The disease is caused by the RVF virus, a member of the genus *Phlebovirus* (family *Bunyaviridae*).

The disease was first reported in Kenya around 1915 and has since been reported across sub-Saharan Africa. There have been outbreaks in Egypt in 1977-78, Saudi Arabia and Yemen..

In humans the virus can cause several different syndromes. Usually sufferers have either no symptoms or only a mild illness with fever, headache, myalgia and liver abnormalities. In a small percentage of cases (< 2%) the illness can progress to hemorrhagic fever syndrome, meningoencephalitis (inflammation of the brain), or affecting the eye. Patients who become ill usually experience fever, generalized weakness, back pain, dizziness, and weight loss at the onset of the illness. Typically, patients recover within 2-7 days after onset.

The vast majority of human infections result from direct or indirect contact with the blood or organs of infected animals. The virus can be transmitted to humans through the handling of animal tissue during slaughtering or butchering, assisting with animal births, conducting veterinary procedures, or from the disposal of carcasses or fetuses. Certain occupational groups such as herders, farmers, slaughterhouse workers and veterinarians are therefore at higher risk of infection. The virus infects humans through inoculation, for example via a wound from an infected knife or through contact with broken skin, or through inhalation of aerosols produced during the slaughter of infected animals. The aerosol mode of transmission has also led to infection in laboratory workers.

There is some evidence that humans may also become infected with RVF by ingesting the unpasteurized or uncooked milk of infected animals.

Human infections have also resulted from the bites of infected mosquitoes, most commonly the *Aedes mosquito*.

Transmission of RVF virus by hematophagous (blood-feeding) flies is also possible.

To date, no human-to-human transmission of RVF has been documented, and no transmission of RVF to health care workers has been reported when standard infection control precautions have been put in place.

There has been no evidence of outbreaks of RVF in urban areas.

### **Mild form of RVF in humans**

The incubation period (interval from infection to onset of symptoms) for RVF varies from two to six days.

Those infected either experience no detectable symptoms or develop a mild form of the disease characterized by a feverish syndrome with sudden onset of flu-like fever, muscle pain, joint pain and headache.

Some patients develop neck stiffness, sensitivity to light, loss of appetite and vomiting; in these patients the disease, in its early stages, may be mistaken for meningitis.

The symptoms of RVF usually last from four to seven days, after which time the immune response becomes detectable with the appearance of antibodies and the virus gradually disappears from the blood.

### **Severe form of RVF in humans**

While most human cases are relatively mild, a small percentage of patients develop a much more severe form of the disease. This usually appears as one or more of three distinct syndromes: ocular (eye) disease (0.5-2% of patients), meningoencephalitis (less than 1%) or haemorrhagic fever (less than 1%).

Ocular form: In this form of the disease, the usual symptoms associated with the mild form of the disease are accompanied by retinal lesions. The onset of the lesions in the eyes is usually one to three weeks after appearance of the first symptoms. Patients usually report blurred or decreased vision. The disease may resolve itself with no lasting effects within 10 to 12 weeks. However, when the lesions occur in the macula, 50% of patients will experience a permanent loss of vision. Death in patients with only the ocular form of the disease is uncommon.

Meningoencephalitis form: The onset of the meningoencephalitis form of the disease usually occurs one to four weeks after the first symptoms of RVF appear. Clinical features include intense headache, loss of memory, hallucinations, confusion, disorientation, vertigo, convulsions, lethargy and coma. Neurological complications can appear later (> 60 days). The death rate in patients who experience only this form of the disease is low, although residual neurological deficit, which may be severe, is common.

Haemorrhagic fever form: The symptoms of this form of the disease appear two to four days after the onset of illness, and begin with evidence of severe liver impairment, such as jaundice. Subsequently signs of haemorrhage then appear such as vomiting blood, passing blood in the faeces, a purpuric rash or ecchymoses (caused by bleeding in the skin), bleeding from the nose or gums, menorrhagia and bleeding from venepuncture sites. The case-fatality ratio for patients developing the haemorrhagic form of the disease is high at approximately 50%. Death usually occurs three to six days after the onset of symptoms. The virus may be detectable in the blood for up to 10 days, in patients with the hemorrhagic icterus form of RVF.

The total case fatality rate has varied widely between different epidemics but, overall, has been less than 1% in those documented. Most fatalities occur in patients who develop the haemorrhagic icterus form.

A person's chances of becoming infected can be reduced by taking measures to decrease contact with mosquitoes and other bloodsucking insects through the use of mosquito repellents and bednets. Avoiding exposure to blood or tissues of animals that may potentially be infected is an important protective measure for persons working with animals in RVF-endemic areas.

### **Prevention**

Awareness and use of PPE, good hygiene and other avoidance practices used for other zoonotic diseases should be used.

## **Nipah and Hendra Viruses**

Nipah virus is a newly recognized zoonotic virus. The virus was 'discovered' in 1999. It has caused disease in animals and in humans, through contact with infectious animals. The virus is named after the location where it was first detected in Malaysia.

Nipah is closely related to another newly recognized zoonotic virus (1994), called **Hendra** virus, named after the town where it first appeared in Australia. Both Nipah and Hendra are members of the virus family *Paramyxoviridae*. Although members of this group of viruses have only caused a few focal outbreaks, the biologic property of these viruses to infect a wide range of hosts and to produce a disease causing significant mortality in humans has made this emerging viral infection a public health concern.

## **Natural Host**

It is currently believed that certain species of fruit bats are the natural hosts of both Nipah and Hendra viruses. They are distributed across an area encompassing northern, eastern and south-eastern areas of Australia, Indonesia, Malaysia, the Philippines and some of the Pacific Islands. The bats appear to be susceptible to infection with these viruses, but do not themselves become ill. It is not known how the virus is transmitted from bats to animals.

## **Transmission**

The mode of transmission from animal to animal, and from animal to human is uncertain, but appears to require close contact with contaminated tissue or body fluids from infected animals. Nipah antibodies have been detected in pigs, other domestic and wild animals. The role of species other than pigs in transmitting infection to other animals has not yet been determined.

It is unlikely that Nipah virus is easily transmitted to man, although previous outbreak reports suggest that Nipah virus is transmitted from animals to humans more readily than Hendra virus. Despite frequent contact between fruit bats and humans there is no serological evidence of human infection among bat carers. Pigs were the apparent source of infection among most human cases in the Malaysian outbreak of Nipah, but other sources, such as infected dogs and cats, cannot be excluded. Human-to-human transmission of Nipah virus has not been reported.

## **Clinical Features**

Nipah Virus - The incubation period is between 4 and 18 days. In many cases the infection is mild or inapparent (sub-clinical). In symptomatic cases, the onset is usually with "influenza-like" symptoms, with high fever and muscle pains (myalgia). The disease may progress to

inflammation of the brain (encephalitis) with drowsiness, disorientation, convulsions and coma. Fifty percent of clinically apparent cases die.

Hendra Virus - respiratory illness with severe flu-like signs and symptoms

### **Protection**

The risk of transmission of Nipah and virus from sick animals to humans is thought to be low, and transmission from person-to-person has not yet been documented, even in the context of a large outbreak. Therefore, the risk of transmission of Nipah virus to health care workers is thought to be low. However, transmission without percutaneous exposure (through a break in the skin barrier) is theoretically possible, as respiratory secretions contain the virus. This is why it has been categorized as a biohazardous agent that should be managed in a high-level biosecurity laboratory. It is recommended that close contact with body fluids and infected tissues be avoided if Nipah or hendra virus infection is suspected.



## Bird and Bat Borne or Enhanced Diseases

See also under **Molds and Fungus**

### Psittacosis

Psittacosis is a disease caused by a bacteria that is found in bird droppings and other secretions (often carried by pet birds). The bacteria is found worldwide.

Symptoms of psittacosis infection may include a low-grade fever that often becomes worse as the disease progresses, including anorexia, sore throat, light sensitivity, and a severe headache.

Ammonia and sodium hypochlorite based disinfectants are effective disinfectants for Psittacosis.

Where it is necessary to remove bat droppings from buildings prior to renovation or demolition it is prudent to assume infection and use the following precautions:

- Avoid areas that may harbor the bacteria, e.g., accumulations of bird or bat droppings.
- Areas known or suspected of being contaminated by *the organisms causing* Psittacosis such as bird roosts, attics, or even entire buildings that contain accumulations of bat or bird manure, should be posted with signs warning of the health risk. The building or area should be secured
- Before an activity is started that may disturb any material that might be contaminated by Psittacosis, workers should be informed in writing of the personal risk factors that increase an individual's chances of developing these diseases. Such a written communication should include a warning that individuals with weakened immune systems are at the greatest risk of developing severe forms of these diseases become infected. These people should seek advice from their health care provider about whether they should avoid exposure to materials that might be contaminated with these organisms.

The best way to prevent exposure is to avoid situations where material that might be contaminated can become aerosolized and subsequently inhaled. A brief inhalation exposure to highly contaminated dust may be all that is needed to cause infection and subsequent development of psittacosis. Therefore, work practices and dust control measures that eliminate or reduce dust generation during the removal of bat manure from a building will also reduce risks of infection and subsequent development of disease. For example, instead of shoveling or sweeping dry, dusty material, carefully wetting it with a water spray can reduce the amount of dust aerosolized during an activity. Adding a surfactant or wetting agent to the water might reduce further the amount of aerosolized dust.

Once the material is wetted, it can be collected in double, heavy-duty plastic bags, a 55-gallon drum, or some other secure container for immediate disposal. An alternative method is use of an

industrial vacuum cleaner with a high-efficiency filter to *bag* contaminated material. Truck-mounted or trailer-mounted vacuum systems are recommended for buildings with large accumulations of bat or bird manure. These high-volume systems can remove tons of contaminated material in a short period. Using long, large-diameter hoses, such a system can also remove contaminated material located several stories above its waste hopper. This advantage eliminates the risk of dust exposure that can happen when bags tear accidentally or containers break during their transfer to the ground.

The removal of all material that might be contaminated from a building and immediate waste disposal will eliminate any further risk that someone might be exposed to aerosolized spores. Air sampling, surface sampling, or the use of any other method intended to confirm that no infectious agents remain following removal of bat manure is unnecessary in most cases. However, before a removal activity is considered finished, the cleaned area should be inspected visually to ensure that no residual dust or debris remains.

Spraying 1:10 bleach to water mixture on droppings and allowing it to dry is also a recommended practice for the psittacosis organisms.

Because work practices and dust control measures to reduce worker exposures to these organisms have not been fully evaluated, using personal protective equipment is still necessary during some activities. During removal of an accumulation of bat or bird manure from an enclosed area such as an attic, dust control measures should be used, but wearing a NIOSH-approved respirator and other items of personal protective equipment is also recommended to reduce further the risk of exposure to the organisms that cause Psittacosis.

## Treatment

Psittacosis is often hard to diagnose and while a concern, it does not occur with great frequency. Knowledge of the symptoms and of potential exposure is important when seeking medical follow-up for potential exposure.

There are various medical treatments for psittacosis based on extent of infection. The sooner the disease is diagnosed and treatment is begun the more effective the treatment will be.

## **APPENDIX A**

### **Dangerous Animals - Wildlife Hazard Recognition and Protection**

#### **GENERAL**

Work in remote areas inhabited by wild animals that have been known to cause injury and kill human beings, requires that companies working in these areas carefully plan for wildlife encounters. This procedure outlines actions that when properly implemented should provide a high degree of protection for employees and wildlife.

These procedures apply to employees who prepare Health and Safety Plans or perform fieldwork in environments in which wild animals may be encountered. However, due to the unpredictable nature of wild animals this single document cannot possibly cover all potential risks or protective measures. Therefore, prior to entering remote areas inhabited by dangerous wildlife, contact local wildlife agencies to gather additional information concerning local risks and protective measures.

#### **REFERENCES**

Alaska Administrative Code 5 AAC 92.230 and 5 AAC 92.410.

Alaska Department of Fish and Game, Division of Wildlife Conservation.

<http://www.state.ak.us/adfg/adfghome.htm>

State of Washington Fish and Wildlife, Living with Wildlife.

<http://www.wa.gov/wdfw/wildlife.htm>

#### **ATTACHMENTS**

Attachments 1 through 4 outline behavioral characteristics of and outline controls that will minimize human injury, loss of property, and unnecessary destruction of wildlife, while ensuring a safe work environment. Attachment 5 provides the Project Specific Exemption for Firearms request form.

#### **RESPONSIBILITIES**

The responsibilities of personnel involved in Wildlife Hazard Recognition and Protection are:

- The Corporate EHS Manager (EHS Manager) review and approval of site health and safety plans (HSP) that require the Project Specific Exemption for Firearms.
- Project Manager / Site Manager: In addition to the safety responsibilities described in the Safety Program Implementation Plan, the Project Manager (PM) or Site Manager (SM) are responsible for ensuring that the Health and Safety Plan (HSP) addresses hazards associated with wild animal encounters, as appropriate and ensuring that persons designated to carry firearms meet the criteria outlined in this procedure. Additionally, if other approvals are necessary for carrying firearms, the PM must ensure that adequate time is allotted for the approval process.

#### **WILDLIFE AVOIDANCE AND BASIC PROTECTIVE MEASURES**

The best protective measure is simply avoidance. Large numbers of humans present deterrence to wild animals; therefore, whenever possible teams in the field should work together in groups of four or more. Whenever practical, fieldwork should be scheduled around the seasonal cycles of wildlife in the area. When wild animal avoidance cannot be achieved through scheduling,

personnel involved in field activities in which encounters with wild animals may result, will take the following steps and will be equipped and trained, as set forth below.

### **CLEAR THE AREA**

Evaluate and control the area before entry by

- Determine areas of recent sightings through local Fish and Game, state troopers, etc.;
- Conduct a site observation from an off-site elevated point, if possible;
- Conduct a controlled walk through in the area by a trained observer;
- Arrange a briefing by a local specialist, e. g., Fish and Game, etc.; and
- Utilizing appropriate noisemakers.

### **BASIC EQUIPMENT**

Employees entering an environment where encounters with wild animals are possible should be provided, as a minimum:

- Noisemakers, such as air horns, bells, etc.; and
- Bear spray of not less than 16-ounce capacity (with holster), equivalent to capsicum pepper (red pepper extract), which is capable of spraying at least 15 feet. (Notes: Normally cannot be transported in side aircraft passenger compartments and may be considered a hazardous material, check with airlines and hazardous material shippers for current information).

### **TRAINING**

Prior to entering and / or working in areas inhabited by dangerous wildlife each employee should receive training as outlined in this procedure. At a minimum, training must include information related to:

- Wildlife present, habitat, behavior patterns, including when wild animals are most active, etc.
- Warning signs, such as tracks, bedding areas, scat, claw marks, offspring, paths, etc.,
- Avoidance measures
- Other hazards, precautions, and protective measures as outlined in the Attachments,
- (At the jobsite) spray demonstration and safety instructions which include location of and persons designated as “bear watch”

An outline of the training content should be reviewed and approved by the Divisional EHS manager and should be documented. A record of the training will be maintained at the job site, filed with the SSHSP and in the employee’s training records.

### **SUPPLEMENTAL PROTECTION**

In some areas it may be necessary (or preferred) to employ professional hunting guide services where significant possibility of encounters with wildlife exist. The PM and DSM will evaluate the need for supplemental protection. In addition to Weston’s standard minimum qualifications for subcontractors, prospective bear and wild animal protection contractors must be able to provide evidence of competency. This evidence shall include:

- Proof of firearm safety training and;
- Proficiency with firearms and;
- Should have three or more years experience providing similar services.

In addition to the above, project managers should review insurance coverage with the Risk Management office to determine whether or not additional insurances should be required.

#### **FIREARMS USE BY WESTON PERSONNEL OR SUBCONTRACTOR EMPLOYEES**

In some situations, the Project Manager (with approved exemption) and client agreement may authorize selected employees or subcontractor employees to carry firearms.

Employees designated to carry firearms must demonstrate proficiency in firearm safety marksmanship through successful completion of a firearm safety training class administered by a Fish and Game Department, a local firearm range instructor, or other approved trainer. Personnel designated to carry firearms must not have been convicted of a crime that has resulted in their loss of the privilege to bear arms; therefore, they must submit to a background check through the NCIC.

Training will be documented and records of training will be maintained on site. At a minimum training must include:

- Animal behavior,
- Firearm handling and safety,
- Demonstrated marksmanship skills, and
- Safe storage of firearms and ammunition.

#### **FIREARMS AUTHORIZED FOR SITE USE**

- **Will not** be carried with a round in the chamber until a dangerous encounter is eminent, such as when a bear has been sighted in the immediate area, and
- **Must** be unloaded with a trigger lock installed when not actively being used for protection to prevent unauthorized persons from using the firearm.
- **Will** be stored in a locked cabinet when not required for use. Only persons qualified to use firearms will have keys to the cabinet.

Military installations require the approval of their security forces before allowing a firearm to be brought onto a military installation. In addition to base requirements, some clients (e.g. AFCEE) may require their approval. The PM must determine with sufficient lead-time whether firearm protection of employees from wild animals will be required. If such is determined to be necessary, the PM must submit a request for authorization to the EHS Manager with sufficient lead-time to permit training and other steps required prior to departure for the field.

All firearms and firearm-carrying personnel shall be registered and approved by the EHS Manager in accordance with the project exemption. Copies of the approved exemption will be maintained in the supporting office. Incomplete requests for exemption will be returned to the project manager without action; therefore, thorough planning at the project level is required to ensure that the project schedule is not impacted.

### **APPROPRIATE FIREARMS**

Advantages and disadvantages of the firearms are discussed in Attachment 1. Firearms that are appropriate for protection against large animals include:

- A .30 caliber-magnum (“300 magnum”) or larger rifle, or
- A 12-gauge shotgun with rifled slugs.
- Other firearms, such as large bore handguns, will be considered on their individual merits.

### **AMMUNITION**

The type of ammunition to be used is best determined through consultation with local fish and game agencies or professional guide services.

- The number of rounds and type of ammunition brought to job sites shall be registered with the on-site SSHO.
- When not in use, ammunition and firearms will be effectively secured/locked up in a vehicle, cabinet, etc.

### **PROTECTIVE MEASURES OF LAST RESORT**

When non-lethal methods of deterrence have been used and / or immediate danger to an individual exists, the wild animal may have to be killed. During project planning consult local provisions of the Defense of Life or Property Regulation in your state. In Alaska, refer to 5 AAC 92.410. After contacting the appropriate fish and game agency, the SSO must submit an incident report to the Division EHS Manager. The individual who shot the animal will make the report. In the state of Alaska, the head and the hide must be salvaged and delivered the Alaska Department of Fish and Game.

### **VEHICLE SAFETY**

Use extreme caution, particularly in darkness, when operating vehicles in areas where wild animals may be present. Collisions with large animals have been known to cause significant property damage and personal injuries to vehicle passengers, including fatalities.

## **ATTACHMENT 1**

### **BEAR SAFETY – HAZARD RECOGNITION AND PRECAUTIONS**

On occasion fieldwork may be conducted in a location where bears may be encountered. The following technical information, precautions, and guidelines for operations in which bears could be encountered is based on experience and conditions for field work in the state of Alaska. Bears are intelligent, wild animals and are potentially dangerous, and would rather be left alone. The more bears are understood the less they will be feared. This attachment is intended to provide information that will enable Weston to plan for bear encounters and to properly address face-to-face encounters.

### **Bear Life History**

Although bears are creatures of habit, they are also intelligent, and each has its own personality. The way a bear reacts is often dictated by what it has learned from its mother, the experience it has had on its own, and the instincts nature has provided. Like other intelligent animals, we can make general statements about bears, but few people can accurately predict their behavior.

Bears have an incredible sense of smell, and seem to trust it more than any other sense. Hearing and sight are also important, but to a lesser degree. A bear's hearing is probably better than ours, but not as keen as a dog's hearing. Their sight is probably comparable to that of a human. Both black and brown bears have similar life styles, although they do not usually get along with each other. Where both species occur in the same area, black bears tend to favor forested habitats while brown bears favor open areas. Since the likelihood of encountering a polar bear is remote, this procedure addresses only black and brown bears. If the project site is in an area where polar bear encounters are a possibility, consult the fish and game department for assistance in planning for encounters.

Bears are opportunists, relying on their intelligence and their senses to find food. They use different habitats throughout the year, depending on the availability of food and other necessities. The area a bear covers in a given year is partially dependent on how far it has to go to satisfy these basic needs. In some areas, individual bears have home ranges of less than a square mile; in other areas ranges can encompass hundreds of square miles. Males usually range over larger areas than females.

In spring, bears begin coming out of hibernation. Males are usually the first bears to emerge, usually in April, and females with new cubs are usually the last, sometimes as late as late June. When bears emerge from their dens, they are lethargic for the first few days, frequently sleeping near their dens and not eating. When they do start eating, they seek carrion (dead moose, caribou, sea mammals, deer, etc.), roots, and emerging vegetation. In coastal areas, beaches become travel corridors as bears seek these foods. In early summer, bears eat new grasses and forage as they develop in higher elevations. Moose and caribou calves are also important foods where they are available. In coastal areas, salmon are the most important food from June through September. This period is one of the few times that bears are found in large groups, and it is the time that most people see bears. Bears often travel, eat, and sleep along streams for weeks at a time.

Other summer foods for bears include salmonberries, grasses, forbs, ground squirrels, and occasionally, adult moose and caribou. When bears kill or scavenge large prey, they commonly cover the portions they cannot eat with sticks and duff. A bear may remain near a food cache for days and it will defend it from intruders.

During the late summer and early fall, bears move inland and consume large amounts of blueberries, elderberries, soapberries, and other succulent fruits. As the seasons progress towards winter, a bear's diet becomes more varied. This is the time that bears are adding final deposits of fat before their long winter naps.

In October and November, bears move into their denning areas and begin preparing a suitable den. Black bears usually den in holes under large trees or rock outcrops, or in small natural cavities. Brown bears usually dig their dens in steep alpine areas. Dens are just large enough for the bears to squeeze into. Bears rarely eat, drink, urinate, or defecate while they are denning. They sleep deeply, but do not truly hibernate, and they can be awakened by loud noises or disturbances.

Cubs are born in the den, usually in January. Black bear cubs usually stay with their mothers for a year and a half, and brown bear cubs usually stay with their mothers for 2.5 to 3.5 years. Black bears are sexually mature at age 2 and brown bears are sexually mature at age 4 – 8. Mating season is in the spring (May or June) and both species are polygamous (multiple mates). Both black and brown bears can live for 25 – 30 years, although most live less than 20 years.

#### **BEAR AND HUMAN INTERACTIONS**

Bears generally prefer to be left alone, but they share their homes with other creatures, including humans, who intrude on virtually every aspect of the bear's life. Bears are normally tolerant of these activities and generally find a secure way to avoid them. Humans can help bears make a graceful retreat and avoid many close encounters by letting them know we are coming. Walking in groups, talking, and wearing noise making devices, such as bear bells, all serve to warn a bear of your approach. When possible, avoid hiking and camping in areas where bears are common, such as bear trails through heavy brush or along salmon streams. Always keep an eye out for bears and bear signs. If you happen upon a dead animal, especially one that is covered with sticks and duff (a bear cache), immediately retreat the way you came, but do not run, and make a detour around the area. If you see a cub up a tree or a small bear walking alone, immediately retreat and detour around the area. Like all young animals, cubs wander away from their mothers, but females are furiously protective when they believe their cubs are threatened. Even if we do everything possible to avoid meeting a bear, sometimes bears come to us.

Bears are both intelligent and opportunistic, and they express these qualities through their curiosity. This curiosity frequently brings them into "human habitat." When this happens, we often feel vulnerable, and the bear is sometimes viewed as a threat or nuisance. In most cases, a curious bear will investigate a "human sign," perhaps test it out (chew on a raft, bite into some cans, etc.), and leave, never to return. If the bear was rewarded during his investigation by finding something to eat, it is hard to stop them from returning once they have had a food-reward. That is why we emphasize the importance of keeping



human food and garbage away from bears. When in bear country, always think about the way you store, cook, and dispose of your food. **Never feed bears!** This is both illegal and foolish. Food should be stored in airtight containers, preferably away from living and sleeping areas. Garbage should be thoroughly incinerated as soon as possible. Fish and game should be cleaned well away from camp, and clothing that smells of fish and game should be stored away from sleeping areas. Menstruating women should take extra precautions to keep themselves as clean as possible, and soiled tampons and pads should be treated as another form of organic garbage. Once a bear has obtained food from people, it may continue to frequent areas occupied by people. If a bear does not find food or garbage after the next few tries, it may give up and move back into a more natural feeding pattern. Occasionally, though, the bear will continue to seek human foods and can become a “problem bear.” Some bears become bold enough to raid campsites and break into cabins to search for human food. Shooting bears in the rump with cracker shells, flares, rubber bullets, and birdshot are common methods of “aversive conditioning.” These are also very dangerous techniques, because they may seriously injure a bear if not done properly and/or they may cause a bear to attack the shooter.

### **TYPES OF BEARS**

The three most prevalent species of are bears are the black bear, the brown (grizzly) bear, and the polar bear. Each has a different life-style and somewhat different behavior pattern.

Black Bear Identification: Black bears are the smallest and most abundant of the bear species in Alaska. They are five to six feet long and stand about two to three feet high at the shoulders. They weigh from 200 to 500 pounds. While they are most commonly black, other color phases include brown (cinnamon), and, rarely, gray (blue), and white. Muzzles are usually brown. Black bears can be distinguished from brown bears by:

- Their head shape (a black bear’s nose is straight in profile, a brown bear’s is dished);
- Their claws (black bear’s claws are curved and smaller, brown bears are relatively straight and longer);
- Their body shape (when standing, a black bear’s rump seems to be higher than its shoulders; a brown bear’s shoulders are usually higher than its rump); and
- By their ears (a black bear’s ears are more prominent than a brown bear’s ears). Range in Alaska Black bears live throughout Alaska, except on Kodiak Islands, the Alaska Peninsula, some islands, and the extreme northern and western portion of the state.

Typical Habitat: Black bears occupy a wide range of habitats, but seem to be most common in forested areas. Black bears are not uncommon in and around human settlements in Alaska.

Brown Bear Identification: Brown and grizzly bears are the same species. They can be over eight feet long and stand five feet high at the shoulder. Weights are typically 600 to 800 pounds, but can reach 1500 pounds. Colors range from blonde to dark brown. Coastal bears (referred to as brown bears) are the largest land carnivores and are usually medium-to-dark brown in color. Interior bears (referred to as grizzly bears) are smaller

and usually have light tips on their hair, giving them a grizzled appearance. A brown bear's muzzle is the same color as its body. Cubs frequently have a white collar around their neck and shoulders. The dished-face and large shoulder hump are distinguishing features of the brown bear.

Range in Alaska: Brown bears live throughout Alaska, except for the southern portion of the panhandle in southeastern Alaska, and on the Aleutians, and some other islands. Biologists estimate that there are from 30,000 and 45,000 brown bears in the state, and in most areas the numbers are stable. Highest densities occur on Admiralty Island, the Kodiak Islands, and the Alaska Peninsula.

Typical Habitat: Brown bears can, and do, use virtually every type of habitat. Although they are less common around human settlements than black bears, brown bears can live in close proximity to people. Polar Bear Identification

Polar Bear Identification: Polar bears are about the same size as coastal brown bears. Colors range from white to yellow. Black nose is prominent. Head shape is similar to that of a black bear, but their long tapering necks make polar bears' heads appear to be small in relation to their body size.

Range in Alaska: Polar bears are found in coastal Alaska and offshore waters from Bristol Bay to the Arctic. Ice conditions dictate local polar bear abundance.

Typical Habitat: Islands, coastlines, and waters near pack ice and ice floes, rarely occurring far inland, except for denning females, are typical habitat.

#### **AVOIDING BEAR ENCOUNTERS WHEN**

- The Bear sees you but you do not know the bear is around: The bear will likely avoid detection people and will simply move away when they sense a human.
- You see a bear and it does not know you are there: Move away slowly. Avoid intercepting the bear if it is walking. If possible, detour around the bear. If the bear is close to you, stand where you are or back away slowly. Do not act threateningly toward the bear, it may know you are there but it has chosen to ignore you as long as you are not a threat.
- You see the bear and the bear sees you: Do not act threateningly, but let the bear know you are human. Wave your arms slowly, talk in a calm voice, and walk away slowly in a lateral direction, keeping an eye on the bear. Unless you are very close to a car or a building, never run from bears. In a bear's world, when something runs it is an open invitation to chase it. Bears will chase a running object even if they have no previous intention of catching it. Bears can run as fast as a racehorse, so humans have little or no chance of outrunning a bear.
- You see a bear; the bear sees you and stands on its hind legs: This means that the bear is seeking more information. Bears stand on their hind legs to get a better look, or smell, at something they are uncertain of. It is your cue to help it figure out what you are. Help the bear by waving your arms slowly and talking to it. Standing is not a precursor to an attack. Bears do not attack on their hind legs. It is also important to remember that when a bear goes back down on all fours from a standing position, it may come towards you a few steps. This is normal, and probably not an aggressive act.

- The bear sees you, recognizes you as a human, but continues to come towards you slowly: This may mean several things, depending on the bear and the situation. It may mean that the bear does not see you as a threat, and just wants to get by you (especially if the bear is used to humans, as in a National Park); the bear wants to get food from you (if it has gotten food from people before); the bear wants to test your dominance (it views you as another bear); or may be stalking you as food (more common with black bear, but a rare occurrence). In all cases, your reaction should be to back off the trail very slowly, stand abreast if you are in a group, talk loudly, and/or use a noise-making device. If the bear continues to advance, you should stop. At this point, it is important to give the bear the message that if he continues to advance it will cost him. Continue to make loud noises and present a large visual image to the bear (standing abreast, open your coat). In bear language, bears assert themselves by showing their size. If an adult brown bear continues to come at you, climbing 20 feet or higher up a tree may also be an option if one is next to you (remember, never run from bears). Keep in mind, though, brown bear cubs and black bears can climb trees, and adult brown bears can reach 10 – 15 feet.
- The bear recognizes you as a human and acts nervous or aggressive: When bears are nervous or stressed they can be extremely dangerous. This is when it is important to try to understand what is going on in the bears mind. Nervous bears growl, woof, make popping sounds with their teeth, rock back and forth on their front legs, and often stand sideways to their opponent. A universal sign of a nervous bear is excessive salivation (sometimes it looks like they have white lips). When a bear shows any of these signs, stand where you are and talk in a calm voice. Do not try to imitate bear sounds, this may only serve to confuse and further agitate the bear. If you are in a group, stand abreast. If you have a firearm available, be prepared to use it.
- The bear charges: If all other signals fail, a bear will charge. Surprisingly, most bear charges are just another form of their language. The majority of these are “bluff charges,” that is; the bear stops before making contact with their opponent. There are many different types of bluff charges ranging from a loping uncertain gait to a full-blown charge. If a bear charges, stand still. If you have a firearm, take appropriate action, but remember, if a bear is wounded, a bluff charge may immediately turn into a real charge as the bear’s mind shifts from an offensive mode to a defensive mode.
- The bear attacks: When all else fails, a bear may attack. Attacks may be preceded by all of the behaviors previously described or they may be sudden. Seemingly unprovoked attacks are often the result of a bear being surprised (and feeling threatened), a bear defending its food cache, or a female defending her cubs. When a bear attacks, it typically runs with its body low to the ground, legs are stiff, ears are flattened, hair on the nape of the neck is up, and the bear moves in a fast, determined way. Front paws are often used to knock the opponent down and jaws are used to subdue it.

## **AFTER A BEAR ENCOUNTER**

If a bear attacks you, your reaction depends on the type of bear that is attacking. If it is a black bear, fight vigorously, for your life may depend on it. Black bears have been known to view humans as prey, and if you struggle with the attacking black bear, it will probably go elsewhere for its meal.

Brown bears are a completely different story. Brown bears attack because they feel threatened, and they will continue to press the attack until the threat has been neutralized. If you fight and struggle, the bear will continue to fight, and a human has little or no chance to defeat a brown bear in battle. Lie on your face and stomach, place your hands behind your neck, and lie still when you are attacked. A brown bear will no longer see you as a threat and may stop the attack. Although it sounds foolish to play dead while being attacked by a bear, this has been proven to be the best way to survive a brown bear attack. It should be noted that if you fall down and play dead before a bear actually makes contact, the bear might come over to determine what is going on. Actual maulings by bears are very rare. Alaska has more bears than anywhere else in the world, and there are hundreds of thousands of people living, working, and playing in these bears' back yard. Yet, since 1900, there have only been an average of about two people per year mauled by bears in the state, and very few of those instances have resulted in death.

As a last resort, a bear may have to be shot. When this is the only option, it will likely be in a situation that has a sudden onset. Therefore, it is important that you are familiar and comfortable with whatever firearm you decide to carry. Remember that if you wound a bear, you make the situation worse. There is an on-going debate as to what is the best firearm to use for protection from bears. The following are a few of the pros and cons for some of the more popular firearms:

- **Pistols:** Convenient to carry, always with the person, can be used in close quarters during an attack, rapid-fire is possible. However, are dangerous to humans (accidents), much practice is needed to be proficient; may not be powerful enough to stop a large bear.
- **Shotguns:** Can be loaded with a variety of projectiles, effective at close range in brushy situations, rapid-fire is possible, easy to use. They are however inaccurate and ineffective at medium to long range, heavy to carry, potentially dangerous to humans, may not be powerful enough to stop a large bear.
- **Rifles:** Very powerful calibers are available, accurate at both close and long range. However, practice is required for accuracy in an emergency, range of bullet makes it dangerous to humans, heavy and awkward to carry, rapid fire is difficult with bolt action rifles.

There are different thoughts as to the best place to shoot a charging bear. In reality, a person usually has little time to contemplate shot placement in a true bear attack. If you have a choice, it is best to aim at the shoulder and chest area. Bear's skulls are thick and covered with large muscles, so headshots may not be effective. Once you have made the decision to shoot a bear, you have a responsibility to finish the job you have started. Keep firing until you are out of bullets or you are positive the bear is dead. A wounded bear can be dangerous to you and anyone else who comes into the area.

- Bear Sprays: Are easy to carry and use, little risk of permanent damage to bears and humans, effective in many situations. However, using a spray may change a false charge into a real charge, they are ineffective at ranges greater than 20 feet, ineffective in windy conditions, dangerous if accidentally discharged in a closed area such as an aircraft cockpit.

Regardless of the firearm you choose, it is imperative that you realize that the most effective tool you have against an attacking bear is your brain. Although bears are intelligent animals, we are smarter and can often think our way out of a bad situation if we try. We must never let the firearm we carry become a replacement for common sense.

#### **LAWS CONCERNING BEAR/HUMAN INTERACTIONS IN ALASKA**

There are two regulations governing bear and human interactions in Alaska. The first, ACC 92.230, prohibits feeding bears or leaving garbage that attracts them. The other, 5 ACC 92.410, sets guidelines for taking a bear in defense of your life or property (DLP). These DLP provisions specifically state that a bear cannot be killed legally if the problem is caused by the improper disposal of garbage or some other attractive nuisance, or if it is brought about by harassment or provocation of the animal or an unreasonable invasion of its habitat.

The regulation also defines what is considered “property.” If a bear is killed under the DLP provisions, the hide and skull are the property of the state and must be turned over to Fish and Game as soon as possible. The person who shot the bear is also required to submit a written incident report within 15 days. (Obtain a paper copy of this attachment through Corporate Health, Safety, and Environment.).

## ATTACHMENT 2

### HAZARDS AND PRECAUTIONS – MOOSE, ELK, AND DEER

On occasion fieldwork may be conducted in a location where moose may be encountered. The following technical information, precautions, and guidelines for operations in which Moose, Elk, or Deer may be encountered is based on experience and conditions for field work in the state of Alaska. The more these species are understood, the easier it will be to avoid contact with them thus preventing injury to ourselves and to the animals. All big game species are unpredictable and can be dangerous under certain conditions. This attachment is intended to provide information that will enable Weston to plan for encounters and to properly address face-to-face encounters.

#### MOOSE

Moose are the world's largest members of the deer family. The Alaska race is the largest of all the moose. Moose are generally associated with northern forest in North America, Europe, and Russia. In Alaska, they occur in suitable habitat from the Stikine River in the Panhandle to the Colville River on the Arctic Slope, and as far south on the Alaska Peninsula as Herendeen bay. They are most abundant in recently burned areas that contain willow and birch shrubs, on timberline plateaus, and along the major rivers of South-central and interior Alaska. General Description

Moose are long-legged and heavy-bodied with a drooping nose, with a "bell" or dewlap under the chin, and a small tail. Their color ranges from golden brown to almost black, depending on the season and the age of the animal. The hair of newborn calves is generally red-brown, fading to a lighter rust color within a few weeks. Newborn calves weigh 28 to 35 pounds and within five months grow to over 300 pounds. Males in prime condition weigh from 1,200 to 1,600 pounds. Adult females weigh 800 to 1,300 pounds. Only the bull has antlers.

Life History: Cow moose generally breed at 28 months, though some may breed as young as 16 months. Calves are born anytime from mid-May to early June. Cows give birth to twins 15 to 75 percent of the time, and triplets may occur once in every 1,000 births. The incidence of twinning is directly related to range conditions. A cow moose defends her newborn calf vigorously. Calves begin taking solid food a few days after birth. They are weaned in the fall at the time the mother is breeding again. The maternal bond is generally maintained until calves are 12 months old at which time the mother aggressively chases her offspring from the immediate area just before she gives birth. By late October, adult males have exhausted their summer accumulation of fat and their desire for female company. Once again, they begin feeding. Antlers are shed as early as November, but mostly in December and January.

Food Habits: During fall and winter, moose consume large quantities of willow, birch, and aspen twigs. In some areas, moose actually establish a "hedge" or browse line six to eight feet above the ground by clipping most of the terminal shoots of favored food species. Spring is the time of grazing as well as browsing. Horsetail, pond weeds, and grasses. During summer, moose feed on vegetation in shallow ponds, forbs, and leaves of birch, willow, and aspen.

Movement: Most moose make seasonal movements to calving, rutting, and wintering areas. They travel from only a few miles to as many as 60 miles during these transitions.

### **WORKING SAFELY AROUND MOOSE**

Every year someone is injured by a moose and in some cases fatalities are caused by moose attacks. Most cases of moose attack are from cows defending their calves and they are well equipped to do so. Cow moose attack with their front feet and sharp hooves; they can kill wolves and in some cases drive grizzly bears away from their offspring. Bull moose attack with their massive antlers and can do great damage in a short amount of time. One should always be alert when working in moose country. If you encounter a moose, never approach too closely. Moose will generally declare their displeasure of your presence by lowering their ears and raising their hackles (the long hair on their neck and back). Immediately retreat if you see a moose displaying this behavior. If you are about to be attacked by a moose and there are trees present, stay behind the tree. A human can move around a tree faster than a moose can. Use common sense. Avoid contact with any wild animal. Most have the ability injure a human. Never play dead if attacked by a moose. Put something substantial between you and the moose.

### **ROOSEVELT ELK**

Roosevelt Elk are larger, slightly darker in color, and have shorter, less symmetrical yet more massive antlers than the Rocky Mountain Elk found east of the Cascade Mountains in Canada and the United States.

General Description: Elk are members of the deer family and share many physical traits with deer, moose, and caribou. They are much larger than deer, but not as large as moose, which occur in Alaska. Distinguishing features include a large yellowish rump patch, a grayish to brownish body, and dark brown legs and neck. Unlike some members of the deer family, both sexes have upper canine teeth. The males have antlers, which in prime bull are very large, sweeping gracefully back over the shoulders with spikes pointing forward. Alaska elk antlers have a tendency toward crowning, the formation of the three points at the end of each antler. Elk shed their antlers during the winter each year and grow new ones the following summer. The soft growing antler is covered with velvet, which is scraped off by rubbing and jousting after the antlers harden in the fall. Bull elk on Afognak Island are estimated to weigh up to 1,300 pounds. Cow elk are similar in appearance to the bulls, but are smaller and have no antlers.

Life History: Elk calves are born in late May or early June when abundant food is available for the mother and the mild weather increases the calves' chances for survival. Birth usually occurs under the cover of dense spruce forest, hidden from predators and protected from the elements. Calves are born with protective coloration (light spotted areas on the back, which act as camouflage). A few days after giving birth, the mother joins other cow elk with calves. A single cow will often "baby-sit" with the calves while the remaining cows seek food. As summer progresses, elk bands move above timberline and feed on the alpine slopes where breezes keep biting insects at bay and young plants are highly nutritious. By July, the calves, although still nursing, begin feeding on succulent forbs.

Beginning in August, bands of elk congregate and form herds consisting of cows, calves, yearlings, and an occasional mature bull. Nearby, but separate from the heard mature bulls can be found. During September, the bulls join the main herds and mating activities (the rut) begin. Large herds are scenes of vigorous activity as mature bull challenge each other vocally, emitting a high-pitched whistle or bugle, an eerie but thrilling sound. Occasionally, pushing and shoving matches are initiated as the mature bull attempt to take advantage of the larger bull's preoccupation and run past them to win the favors of a female. By mid-October most breeding activities have ceased. Herds may begin to disperse into smaller bands as they move into wintering areas. Winter months are spent in lower valleys and in the dense spruce forest and small openings near the coastline searching for food.

Food: Elk are hardy animals whose large body size and herding tendencies require tremendous amounts of food. From late spring to early fall, with a wide variety of food available, elk are mainly grazers, using grasses, forbs, and other leafy vegetation. By late fall they become browsers, feeding on sprouts and branches of shrubs and trees.

Population: From the original eight transplanted animals, Afognak elk have expanded to about 1,200.

#### **WORKING SAFELY AROUND ELK**

Although elk are not as widely distributed as moose in Alaska, they are large and potentially dangerous when the bulls are in the rut and when you may be near cows with young calves. Follow the same precautions as set forth above for moose. Elk bulls have a tendency to be more aggressive during the rut (September & October) than either moose or deer, and caution should be used when working near bulls during this time of year. Aggressive cows with calves should be avoided as well, since they attack in the same manner as cow moose.

#### **SITKA BLACK-TAILED DEER, MULE DEER, AND WHITE-TAILED DEER**

The Sitka black-tailed deer is native to the wet coastal rain forest of Southeast Alaska and north coastal British Columbia. Transplants have expanded its range and established population now also exist near Yakutat, in Prince William Sound, as well as Kodiak, and Afognak, and Raspberry Islands.

General Description: The Sitka black tailed deer is smaller, stockier, and has a shorter face than other members of the black-tailed group. Fawns are born in early June and weigh six to eight pounds at birth. The average October live weight of adults is about 80 pounds for does and 120 pounds for bucks, although dressed weight bucks of over 200 pounds have been reported. The summer coat of reddish brown is replaced by dark brownish gray in winter. Antlers are dark brown with typical black tailed branching. Normal adult antler development is three points on each side. Average life span is about 10 years, but a few are known to have attained an age of at least 15.

Life History: Fawns are born in late spring. After the winter snow pack recedes, deer disperse; migratory deer move to high elevation alpine/sub-alpine habitats while resident deer remain at lower elevations throughout the forest. Summer and early fall are periods



of active foraging as deer accumulate fat reserves, which will help them through the winter and early spring. With the first heavy frost, deer in the higher alpine and sub-alpine areas descend to the upper forest. The breeding season (or rut) peaks during late November. Breeding bucks spend little time foraging and by late November have used up much of their fat reserve. Does, however, generally enter December in prime condition. Does breed during their second year of life and continue producing fawns annually until they are 10 or 12 years of age. Reproductive success decreases rapidly beyond 10 to 12 years and by age 15, which is probably the maximum life expectancy, reproduction has essentially ceased. Prime age does (5 to 10 years) typically produce two fawns annually.

Throughout the rest of the winter and early spring, deer are generally restricted to uneven-aged old growth forest below 1,500 feet in elevation. The old growth forest provides optimal winter habitat because the high broken canopy intercept much snow but still provides enough light for the growth of forage plants used by deer. During winter, the distribution of deer at various elevations is influenced by changing snow depth. During extreme snow accumulations, many deer congregate in heavily timbered stands at lower elevations, and some may even move into the beach. Spring is a critical period for deer, and if winters are deep and persistent, many deer die of starvation. As snow melts in mid to late spring, deer begin to disperse, and by late spring and early summer they start rebuilding some of the fat reserves lost during winter.

Home Range: Summer and winter home range areas vary from 30 to 1,200 acres and average about 200 acres for radio-collared deer on Admiralty Island. Migratory deer have larger annual home ranges than resident deer. The average distance between summer and winter home ranges is five miles for migratory deer and half a mile for resident deer. Movement of deer between watersheds appears to be minimal during winter.

Food Habits: During summer, deer generally feed on herbaceous vegetation and the green leaves of shrubs. During winter, they are restricted to evergreen forbs and woody browse. When snow is not a problem, evergreen forbs such as bunchberry and trailing bramble are preferred. During periods of deep snow, woody browse such as blueberry, yellow cedar and hemlock, and arboreal lichens are used. Woody browse alone, however, is not an adequate diet and deer rapidly deplete their energy reserves when restricted to such forage.

Populations: Deer populations in Alaska are dynamic and fluctuate considerably with the severity of the winters. When winters are mild, deer numbers generally increase. Periodically, however, a severe winter will cause a major decline in the population. Deer have a high reproductive potential, and depressed populations normally recover rapidly. In some cases, however, predation may speed deer decline, as well as slow recovery to higher levels. The wolf, which occurs on the mainland and islands south of Frederick Sound, is considered the major predator of deer in Southeast Alaska. Both black and brown bears also prey on deer to some degree.

### **WORKING SAFELY AROUND DEER**

The White-tailed deer found throughout the eastern and western part of the United States have been known to attack people on many occasions. It is unknown whether Black-tailed deer have made any such attacks, but it is possible for someone to be injured by an irate buck in the breeding season (late fall). Deer are well equipped to injure humans. They are very fast. Bucks have sharp antlers and can clear amazingly high obstacles with graceful, arching leaps. They can run with remarkable speed, even in dense cover, and have excellent camouflage. When working in areas populated with deer, whether it be White-tailed, Black-tailed, or Mule deer, it is just common sense not to approach any large wild animal too closely. It is unlikely that an attack from a deer would be fatal but it is possible and serious injury is likely.

## ATTACHMENT 3

### AMERICAN BISON AND FERAL WILD CATTLE – HAZARD RECOGNITION AND PRECAUTIONS

American Bison (Bison), which shaped the lifestyle of the plains Indians and figured prominently in American history before they were brought to near extinction, were transplanted to Alaska from Montana in 1928. While bison were the most common large land mammal in Alaska thousands of years ago, all of Alaska's wild bison came from 20 animals released near Delta Junction. Natural emigration and transplants have now created additional herds at Copper River, Chitina River, and Farewell. Small domestic herds are located at Healy, Kodiak Island, and on Provo Island. There were approximately 700 wild bison in the state in mid-1985.

General Description: The bison is the largest native land mammal in North America. A full-grown bull stands six feet at the shoulder, is up to 10 feet long, and can weigh more than a ton. Full-grown cows are smaller, but have been known to weigh over 1,200 pounds. A bison's head and forequarters are massive and seem out of proportion to the smaller hind parts. Bison have vertebrae, which begins just ahead of the hips and reaches its maximum height above the front shoulder. From above the shoulder, the hump drops almost straight down to the neck. The bison's horns curve upward. The horns of the bull are larger and heavier than the horns of the cow. As winter progresses, their coats change color and are much paler by spring. When the weather warms, the hair loosens and hangs in patches until it is completely shed and replaced with new hair by late spring. Hair on the chin resembles a goatee. Older animals tend to have more hair on their heads.

Life History: Most bison young are born in May, but calves are born from April to August or even later. Newly born calves have a reddish coat. They are able to stand when only 30 minutes old; within three hours of birth, they can run and kick their hind legs in the air. At about 6 days of age, calves start grazing. Their reddish-orange coat begins to darken at about 10 weeks, with the molt to dark brown complete about five weeks later. Cows are sexually mature at two years of age and give birth to single calves twice in three years. The gestation period is approximately 270 days. On rare occasions, a mostly white or even albino calf has been born in the Delta herd, but none has reached maturity. Bison in Alaska have been known to live to a relatively great age compared to other hoofed animals (ungulates). One tagged bull killed in the Copper River area was over 20 years old. Bison are migratory animals by nature. Alaska's wild bison do not remain in single herds, but scatter alone or in-groups ranging up to 50 animals or more. In the Delta Junction area, they move far up the Delta River in early spring to secluded meadows where they calve. Around August they travel back downstream, eventually moving on the Delta Junction Bison Range, and finally in late fall, onto farms where they remain throughout the winter. Here they sometimes cause damage to un-harvested crops. Alaska's other wild bison herds also have seasonal movement patterns. Bison move slowly while feeding and appear to be quite clumsy. This is pure deception, for when pursued, the bison is fleet of foot and has great endurance. A mature bull eventually captured at Delta Junction jumped a seven-foot log fence from a standing position.

Food Habits: Bison are grazing animals and in Alaska find only limited amounts of food along rivers, in recent burns, and sedge potholes. Their diet is made up mainly of various grasses and forbs like vetch, a favored summer food found on gravel bars. Sedges, silverberry, willow, and ground birch are also eaten.

Working Safely Around Bison: When working in areas where bison are present, follow the same precautions as stated above for other large potentially dangerous wild animal. Generally, where bison are present there also will be moose and Brown (Grizzly) bears sharing the same area. Partially due to the relatively sparse population, bison injure fewer people than Brown Bears or moose. Never approach bison and use caution when working near bison as they are unpredictable and can cover a lot of ground in a short amount of time. Bison can be found in timbered areas. If approached by a bison and you cannot make it to a vehicle, keep a large tree between you and the bison. You can move around the tree faster than the bison. If a single bison or heard of bison approach you or your crew, retreat to your vehicle and leave the area. Do not attempt to “drive” the bison from your area while in your vehicle. Bison have no respect for cars and could charge and damage your vehicle and the occupants. The best way to avoid contact is to use your head and give the bison the right of way.

#### **FERAL OR WILD CATTLE**

Feral or wild cattle are only found in a few remote locations in Alaska. A population exists on Sitkinak Island on the south end of Kodiak Island, Long Island, Harvester Island, and Chirikof Island. The same caution should be used when working in areas with a population of wild cattle that would be used when working around any of Alaska’s dangerous wildlife. Never approach too closely and if they begin to approach you, clear the area as fast as possible. If you arrive at your work site and there are wild cattle close by, stay in your vehicle and remain there until they leave the area. If it is necessary to destroy a wild cow, you must notify the Department of Fish & Game. The same Defense of Life and Property (DLP) law that applies to big game species does not apply to wild domestic cattle, but you will be required to salvage the meat and make the report. Cattle reside on leased ground, and the owner of the leases must also be notified. It may also be necessary to compensate the landowner.

Wild Feral Cattle can be dangerous, and there are reports of injuries to people. Although they may look domestic cattle, they are wild and have no fear or respect for humans. Give them the right of way, use common sense, and maintain a safe distance when working where wild Feral Cattle inhabit the area.

## ATTACHMENT 4

### **MOUNTAIN LIONS (COUGARS) – HAZARD RECOGNITION AND PRECAUTIONS**

Mountain lions range throughout the Western United States and are the largest cat in North America, weighing considerably more than its cousins — the lynx, bobcat and domestic cat. Sleek and graceful, the cougar is a solitary and secretive animal rarely seen in the wild. However, in many areas humans are encroaching on wildlife habitat and cougar numbers are rebounding, the number of cougar sightings in suburban areas is on the rise

### **COUGAR COUNTRY**

Cougars prefer rocky terrain, dense brush and semi-open forests. The other essential ingredient, of course, is deer and elk, the cougar's main prey. Traditionally, cougars were associated almost exclusively with deer and elk herds, but as cougar have expanded their range and adapted to semi-urban areas, smaller mammals like raccoons, coyotes and opossums supplement their diet.

Cougars are territorial animals and maintain home ranges of up to 100 square miles. The lions mark their territories with "scratch hills" or scrapes — leaves, grasses and dirt they rake together into small piles and urinate on. Most active at dawn and dusk, cougars are lone hunters designed for short bursts of speed. They prefer to ambush their prey and often drag their kills to secluded spots where they will eat it and then cover, or cache, the remains for later.

General Description: Cougar, mountain lion, puma, panther, and catamount are common names of this large predator. The cougar is a member of the cat family and have short faces, relatively small rounded ears, and retractable claws. An adult cougar's body length ranges from 42-54 inches with tails nearly 3 feet long (a third of the lion's total length). Adults range from 26-31 inches tall at the shoulder. Adult males can weigh up to 200 pounds, adult females up to 120 pounds. Cougars vary in color from reddish-brown to tawny to gray with a black tip on their tail. Kittens have black spots.

Range/Habitat: Cougars prefer rocky terrain, steep slopes and cliffs, rim rock, dense brush and semi-open forests — essentially the same general range as its prey species, the deer, elk, mountain goat and wild sheep. Over 20,000 cougars are thought to live in the Western United States.

Cougars are primarily crepuscular (active at dawn and dusk) and secretive animals. Adults, particularly the males, roam widely often covering a home range of 75-100 square miles. The lions are territorial and will "mark" their territories by urinating on scratch piles. They den in rock outcroppings, dense thickets and under uprooted trees.

Food: Cougars are carnivores, meaning they eat mainly meat. Their diet consists primarily of deer and elk. Mountain goat, wild sheep, moose, coyotes, porcupine, raccoons, beaver, hares, rodents, and occasionally, domestic animals all supplement their diet. Cougars will cache uneaten portions of their kill or cover it for later consumption, but will not eat spoiled meat, as bears will.

Life span: Cougars 8-12 years are considered old, yet they may live up to 20 years. Cougars breed for the first time between 2 and 3 years of age. They are polygamous, meaning individuals may breed with several different cougars. The bond between male and female is short-lived and the male cougar plays no role in raising the kittens. A female's gestation period is 88-97 days (about 3 months). The animals normally breed every other year and during no particular breeding season. Females usually give birth to two kittens, but litters may range from one to six kittens, and may be born any month of the year. Newborns are 8-12 inches long and weigh less than a pound. Kittens remain with their mother for a year and a half.

#### **COUGARS: CLOSE ENCOUNTERS**

Cougar attacks on humans are extremely rare. In North America, fewer than 20 fatalities and 75 non-fatal attacks have been reported during the past 100 years. However, more cougar attacks have been reported in the western United States and Canada over the past 20 years than in the previous 80. In Washington, of the one fatality and five non-fatal attacks reported since 1924, four attacks have occurred during the 1990's. As cougar numbers increase in Washington and habitat dwindles, the more likely you are to encounter a lion. Young, newly independent cougars of 1 or 2 years of age, presumably having difficulty finding food for themselves, account for the majority of the cougar/human interactions reported in Washington.

#### **IN COUGAR COUNTRY (ESPECIALLY WOODED FOOTHILLS):**

- Keep pets indoors or in secure kennels at night for safety.
- If practical, bring farm animals into enclosed sheds or barns at night, especially during calving or lambing seasons.
- Do not leave pet food or food scraps outside.
- Store garbage in cans with tight-fitting lids so odors do not attract small mammals.
- When children are playing outdoors, closely supervise them and be sure they are indoors by dusk.
- Light walkways and remove any heavy vegetation or landscaping near the house.
- Avoid feeding wildlife or landscaping with shrubs and plants that deer prefer to eat. Remember, predators follow prey.

While recreating or working in cougar country you can avoid close encounters by taking the following precautions:

- Work or hike in small groups and make enough noise to prevent surprising a cougar. Avoid hiking alone.
- Keep small children close to the group, preferably in plain sight just ahead of you.
- Do not approach dead animals, especially recently killed or partially covered deer and elk.
- Be aware of your surroundings, particularly when hiking in dense cover or when sitting, crouching or lying down. Look for tracks, scratch piles, and partially covered droppings.

- Keep a clean camp. Reduce odors that may attract small mammals like raccoons, which in turn attract cougars. Store meat, other foods, pet food, and garbage in double plastic bags.
- Do not leave your pet tied at a campsite, which may also attract cougars. Better yet, leave “Rover” at home when camping or hiking.

#### **WHEN AN ENCOUNTER OCCURS**

If you do come face to face with a cougar, your actions can either help or hinder a quick retreat by the lion. Here are some tips.

- Stop, stand tall and don’t run. Pick up small children immediately. Running and rapid movements may trigger an attack. Remember, a cougar’s instinct is to chase.
- Face the cougar, talk to it firmly and slowly back away. Always leave the animal an escape route.
- Try to appear larger than the cougar by getting above it. (E.g., stepping up onto a stump). If wearing a jacket, hold it open to further increase your size.
- Do not take your eyes off the animal or turn your back. Do not crouch down or try to hide.
- Never approach the animal, especially if it is near a kill or with kittens. Never corner the animal or offer it food.
- If the animal does not flee and shows signs of aggression (crouches with ears back, teeth bared, hissing, tail twitching, and hind feet pumping in preparation to jump), be more assertive. Shout, wave your arms and throw rocks. The idea is to convince the cougar that you are not prey, but a potential danger.

If the cougar attacks, fight back aggressively and try to stay on your feet. Cougars have been driven away by people who have fought back using anything within reach, including sticks, rocks, shovels, backpacks, and clothing — even your bare hands. Generally, if you are aggressive enough, a cougar will flee, realizing it has made a mistake.

## **ATTACHMENT 5**

### **PROJECT SPECIFIC EXEMPTION FOR FIREARMS**

Weston Corporate policy (insert OP#) specifically prohibits firearms on Weston premises or project sites. However, in some remote locations firearms may be necessary to ensure a safe work environment. When the project manager has determined that firearms are necessary the Policy # \_\_\_\_ Project Specific Exemption for Firearms form (attached) must be completed and submitted with the SSHP. The Corporate EHS Manager (or designated representative in his absence) is authorized to grant a project specific exemption.

The project specific exemption applies only to projects where firearms are required and should be omitted when other controls are deemed appropriate. To obtain an exemption, complete the attached form and submit it along with the HSP to the Corporate EHS for approval.



Project Specific Exemption for Firearms				
Project Name:			End Date:	
Location:			Start Date:	
Contract Number:			WO No.:	
Wildlife Species of Concern:				
Project Narrative (Brief description of the scope of work):				
Justification (Brief narrative supporting firearm exemption):				
The following named personnel have demonstrated proficiency in wildlife protection through training and experience (Attach copies of training documents), have voluntarily submitted to a check through the National Criminal Information Computer (NCIC) and have no convictions that prevent them from possessing firearms, have agreed to perform the duties as outlined in the HSP; therefore granted an exemption and permitted to possess firearms on the project site for the express purpose of wildlife protection.				
Employee Name	SSAN	Company	Title	NCIC
				Pass / Fail
				Pass / Fail
				Pass / Fail
				Pass / Fail
This document grants an exception to Roy F. Weston, Inc.'s Policy # ____ and permits firearms on this project for the express purpose of protection from Wildlife. All persons either employed by or subcontracted to Weston must adhere to the requirements for safe handling of firearms and other restrictions as outlined by this Field Operating Procedure ____ and those that may be required by the client, airline companies, and any other concerned agencies or organizations. These restrictions must be stated in the HSP.				
Approvals:				
Title	Name (print or type)	Signature	Date	Approved
Project Manager				Yes / No
OU Manager				Yes / No
Safety Officer				Yes / No
Statement of Compliance: The above persons approving this document have reviewed the requirements of the project and agree that the possession and use of firearms is necessary to ensure that Weston is able to ensure a safe work environment on the stated project. Only those persons named herein shall be permitted to possess firearms.				
Title	Name (print or type)	Signature	Date	Approved
Division EHS Manager				Yes / No
Corporate EHS Manager				Yes / No
The Division and Corporate safety managers have reviewed this request and hereby grant a project specific waiver.				
Approval Comments: (Write comments as appropriate) This exemption does not permit or allow possession of firearms on or in vicinity of, the project location for any purpose other than protection from wildlife.				

## APPENDIX B - PICTURES OF POISONOUS SNAKES AND LIZARDZS

### Americas



American copperhead



– Southern US

Coral Snakes – Western, Eastern and Texas





Cotton Mouth – East and Southeast US



Eastern Diamondback Rattlesnake - Southeast US



Timber Rattlesnake – Eastern US





Dusky Pygmy Rattlesnake - SE US



Mojave Rattlesnake – Southwest US Mexico



Western Diamondback Rattlesnake – SW US



Speckled Rattlesnake - SW US



Massasauga – North and South Central US



Black-tailed Rattlesnake – South Central US and Mexico





Tiger Rattlesnake – Southwest US and Mexico



Sidewinder – Southwest US



Bush Master – Central and South America, Caribbean



Eyelash Pit Viper



Fer-de-Lance – Central & South America



Jumping Viper – Central America



Tropical rattlesnake - Southern Mexico, Central America, and South America.

## Lizards



Gila Monster – SW US



Mexican Bearded Lizard – Mexico and Central America



Europe



Common Adder - Throughout Europe



Long nosed Adder - Italy, Yugoslavia, northern Albania, and Romania



Pallas Viper - Throughout southeastern Europe.



Ursini Viper - Most of Europe, Greece, Germany, Yugoslavia, France, Italy, Hungary, Romania, Bulgaria, and Albania.

## Africa and Asia

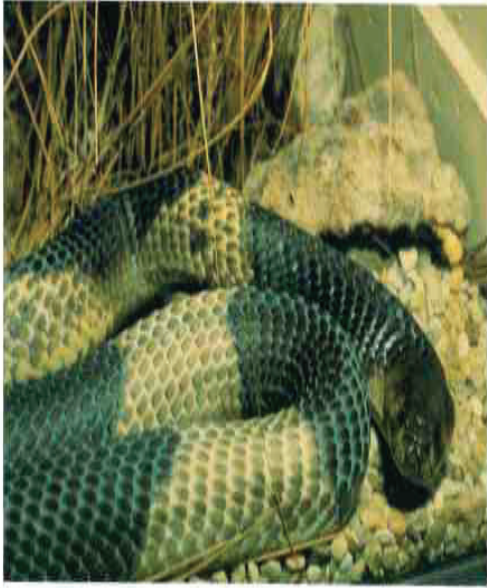


Boomslang - sub-Saharan Africa



Bush Viper - Most of Africa, Angola, Cameroon, Uganda, Kenya, and Zaire





Africa, Iraq, Syria, and Saudi Arabia



Gaboon viper - Most of Africa



Green Mamba - Most of Africa.



Rhinoceros viper or river jack – Equatorial Africa



Green Tree Pit Viper - India, Burma, Malaya, Thailand, Laos, Cambodia, Vietnam, China, Indonesia, and Formosa.



Habu pit viper - Okinawa and neighboring islands and Kyushu



Mole or Burrowing Viper  
Sudan, Ethiopia, Somaliland, Kenya, Tanganyika, Uganda, Cameroon, Niger, Congo, and Urundi.



## Middle East



Puff Adder - Most of Africa, Saudi Arabia, Iraq, Lebanon, Israel, and Jordan



Sand Viper - Northern Sahara, Algeria, Egypt, Sudan, Nigeria, Chad, Somalia, and central Africa.



Saw Scaled Viper - Asia, Syria, India, Africa, Iraq, Iran, Saudi Arabia, Pakistan, Jordan, Lebanon, Sri Lanka, Algeria, Egypt, and Israel.



**Field's horned viper, False Eye-horned viper - Middle East and as far east as Pakistan**

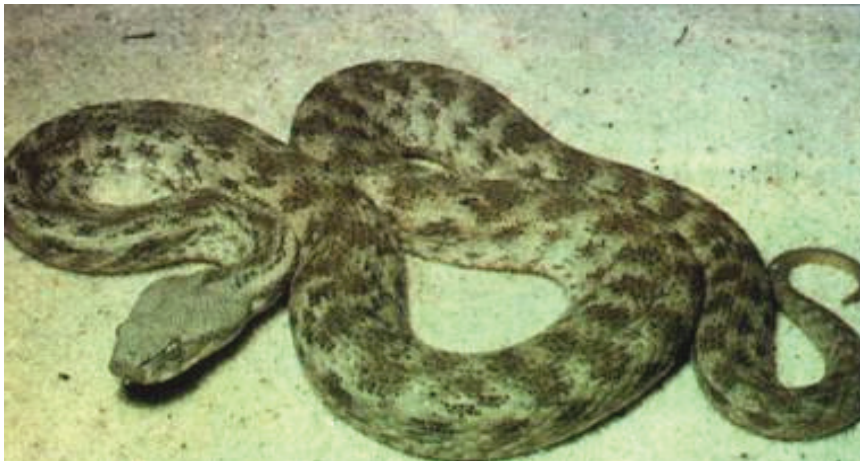


**Horned Asp, (true) Desert Horned/Eye-Horn Viper, desert horned sidewinder Northern Africa and parts of the Middle East.**

**Desert Cobra, Desert Black Snake**



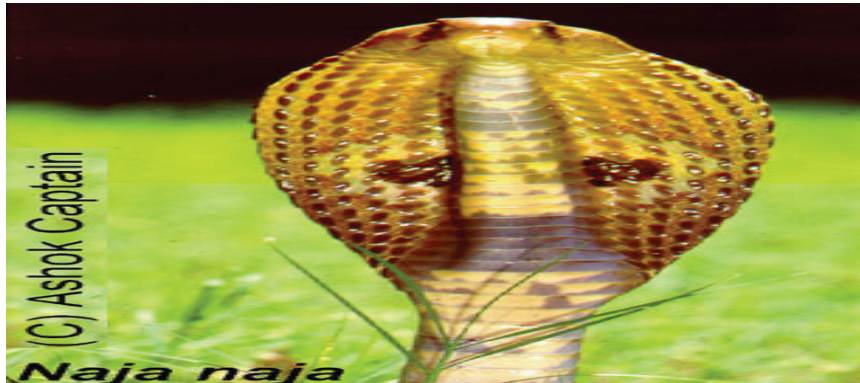
Palestinian Viper - Turkey, Syria, Palestine, Israel, Lebanon, and Jordan



Levant viper or Levant adder, aka: desert or mountain adder, 'kufi' - Greece, Iraq, Syria, Lebanon, Turkey, Afghanistan, lower portion of the former USSR, and Saudi Arabia.



India



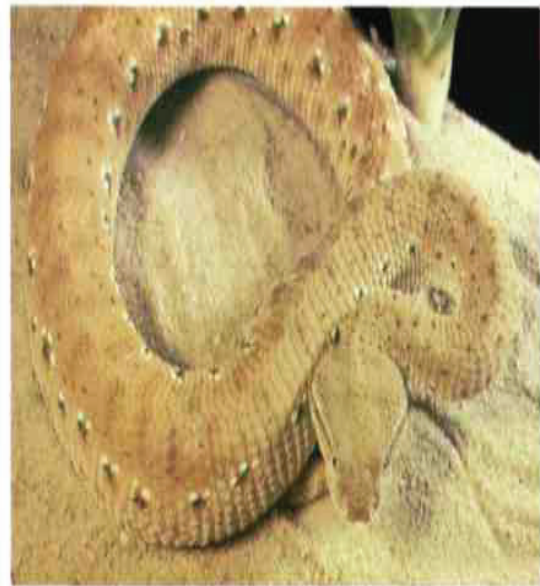
**Cobra**



**Common Krait -**  
India, Sri Lanka, and  
Pakistan.



Malayan Pit Viper - Thailand, Laos,  
Cambodia, Java, Sumatra, Malaysia,  
Vietnam, Burma, and China



McMahon's Viper- West Pakistan and Afghanistan.



Russell's Viper - Sri Lanka, south China, India, Malaysian Peninsula, Java, Sumatra, Borneo, and surrounding islands.



Wagler's pit viper or temple viper - Malaysian Peninsula and Archipelago, Indonesia, Borneo, the Philippines, and Ryuku Islands.



## Australasia



Australian Copperhead - Tasmania, South Australia, Queensland, and Kangaroo Island.



Death Adder Australia, New Guinea, and Moluccas



Taipan - Northern Australia and southern New Guinea



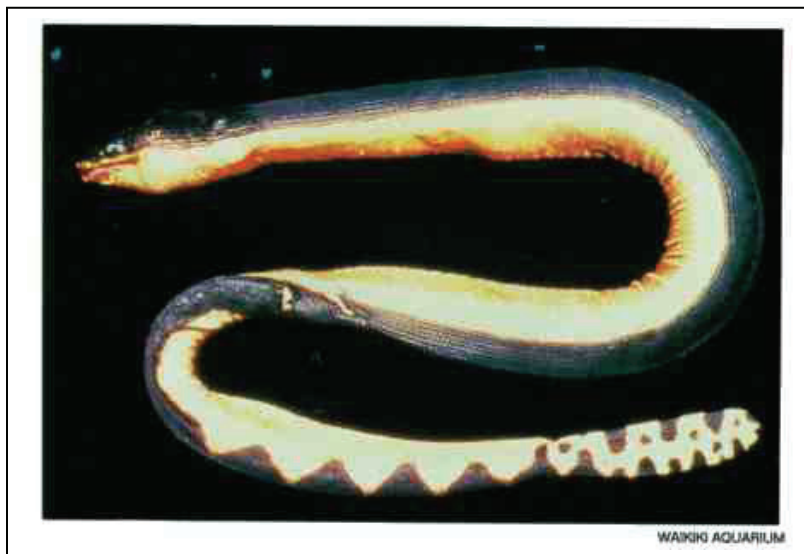


Tiger Snake - Australia, Tasmania, Bass Strait islands, and New Guinea.

#### Sea Snakes



Banded Sea Snake Coastal waters of New Guinea, Pacific islands, the Philippines, Southeast Asia, Sri Lanka, and Japan.



Yellow Bellied Sea Snake - Throughout the Pacific Ocean from many of the Pacific islands to Hawaii and to the coast of Costa Rica and Panama.

## **FLD 43 BIOLOGICAL HAZARDS - GENERAL**

### **RELATED FLDS**

*FLD 44 – Biological Hazards – Bloodborne Pathogens Exposure Control Plan – First Aid Providers*

*FLD 45 – Biological Hazards – Bloodborne Pathogens Exposure Control Plan – Work with Infectious Waste*

Field personnel and travelers may encounter biological hazards that include endemic hazards as follows: animals, insects, molds and fungus, and plants. In addition, personnel may be exposed to etiological agents (infectious diseases). An important part of health and safety planning and protection includes identifying and understanding local flora and fauna. Animals, insects, molds, fungus, and poisonous plants, and potential for exposure to infectious agents, which are also referred to as microbes, vary from site to site. Their likelihood of causing harm also varies. Risk assessment and protection protocol determinations include knowing the how, where, and what of hazardous types of plants, animals, insects, molds and fungus and infectious agents (microbes).

A set of guidance documents on the WESTON EHS Portal Site describe General Biological Hazards. While extensive, these guidance documents may not be all inclusive. They should provide a starting point for developing Accident Prevention Plans and Site-Specific Health and Safety Plans, but staff is encouraged to review additional information sources. A variety of resources are available to determine potential biological hazards at a work location, including the local health department.

Guidance documents on the EHS Portal Site provide information on the following biological hazards:

- Animals
- Insects
- Molds And Fungi
- Poisonous Plants
- Infectious Diseases (Microbes)

## **FLD 43 B     INSECTS**

### **Sting and Biting Insects**

Contact with stinging insects may result in site personnel experiencing adverse health affects that range from being mildly uncomfortable to being life threatening. Therefore, stinging insects present a serious hazard to site personnel and extreme caution must be exercised whenever site and weather conditions increase the risk of encountering stinging insects. These include the following:

- Bees ("Killer" bees, honeybees, bumble bees, wasps, and hornets and wingless wasps)
- Scorpions
- Fire ants
- Spiders

### **Bees, Wasps, Hornets and Yellow Jackets**

The severity of an insect sting reaction varies from person to person. A normal reaction will result in pain, swelling and redness confined to the sting site. Simply disinfect the area (washing with soap and water will do) and apply ice to reduce the swelling.

A large local reaction will result in swelling that extends beyond the sting site. For example, a sting on the forearm could result in the entire arm swelling twice its normal size.

Although alarming in appearance, this condition is often treated the same as a normal reaction. An unusually painful or very large local reaction may need medical attention. Because this condition may persist for two to three days, antihistamines and corticosteroids are sometimes prescribed to lessen the discomfort.

Yellow jackets, hornets and wasps can sting repeatedly. Honeybees have barbed stingers that are left behind in their victim's skin. These stingers are best removed by a scraping action, rather than a pulling motion, which may actually squeeze more venom into the skin.

Personnel should be very cautious of "killer" bees. They have the appearance of the typical honeybee, however, they are very aggressive. These Africanized honeybees (AHB) defend their colonies much more vigorously than typical bees. The colonies are easily disturbed (sometimes just by being nearby). When they do sting, many more bees may participate, so there is a danger of receiving more stings. This can make them life threatening, especially to people allergic to stings, or with limited capacity to escape (the young, old, and handicapped).

### **Scorpions**

Scorpion stings are a major public health problem in many underdeveloped tropical countries. For every person killed by a poisonous snake, 10 are killed by a poisonous scorpion. In Mexico, 1000 deaths from scorpion stings occur per year. In the United States, only 4 deaths in 11 years have occurred as a result of scorpion stings. Furthermore, scorpions can be found outside their

normal range of distribution, ie, when they accidentally crawl into luggage, boxes, containers, or shoes and are unwittingly transported home via human travelers.

Out of 1500 scorpion species, 50 are dangerous to humans. Scorpion stings cause a wide range of conditions, from severe local skin reactions to neurologic, respiratory, and cardiovascular collapse.

Almost all of these lethal scorpions, except the *Hemiscorpius* species, belong to the scorpion family called the Buthidae. The Buthidae family is characterized by a triangular-shaped sternum, as opposed to the pentagonal-shaped sternum found in the other 5 scorpion families. In addition to the triangular-shaped sternum, poisonous scorpions also tend to have weak-looking pincers, thin bodies, and thick tails, as opposed to the strong heavy pincers, thick bodies, and thin tails seen in nonlethal scorpions. The lethal members of the Buthidae family include the genera of *Buthus*, *Parabuthus*, *Mesobuthus*, *Tityus*, *Leiurus*, *Androctonus*, and *Centruroides*. These lethal scorpions are found generally in the given distribution:

<i>Centruroides</i> - Southwest USA, Mexico, Central America	<i>Tityus</i> - Central and South America, Caribbean
<i>Buthus</i> - Mediterranean area	<i>Androctonus</i> - Northern Africa to Southeast Asia
<i>Leiurus</i> - Northern Africa and Middle East	<i>Mesobuthus</i> - Asia
<i>Parabuthus</i> - Western and Southern Africa	

A scorpion has a flattened elongated body and can easily hide in cracks. It has 4 pairs of legs, a pair of claws, and a segmented tail that has a poisonous spike at the end. Scorpions vary in size from 1-20 cm in length.

However, scorpions may be found outside their habitat range of distribution when inadvertently transported with luggage and cargo.



**Centruroides (Southwest USA, Mexico)**





**Hemiscorpious (Middle East) cytotoxic**



**Fat Tail Scorpion (Middle East) neurotoxic**



**Death Stalker *Leiurus quinquestriatus* (Africa Southwest and North) neurotoxic**



## **Black Scorpion (Middle East) deadly neurotoxin**

### **Prevention**

Preventive measures include awareness of scorpions, shaking out clothing and boots before putting them on looking before reaching into likely hiding places and wearing gloves, long sleeved shirts and pants.

### **Symptoms**

In mild cases, the only symptom may be a mild tingling or burning at site of sting.

In severe cases, symptoms may include:

- Eyes and ears - Double vision
- Lungs - Difficulty breathing, No breathing, Rapid breathing,
- Nose, mouth, and throat – Drooling, Spasm of the voice box, Thick-feeling tongue
- Heart and blood - High blood pressure, Increased or decreased heart rate, Irregular heartbeat
- Kidneys and bladder Urinary incontinence, Urine output, decreased
- Muscles and joints - Muscle spasms
- Nervous system – Paralysis, Random movements of head, eye, or neck, Restlessness, Seizures, Stiffness
- Stomach and intestinal tract - Abdominal cramps, Fecal incontinence
- Other -Convulsions

### **Treatment**

1. Recognize scorpion sting symptoms:
2. Wash the area with soap and water.
3. Apply a cool compress on the area of the scorpion sting. Ice (wrapped in a washcloth or other suitable covering) may be applied to the sting location for 10 minutes. Remove compress for 10 minutes and repeat as necessary.
4. Call the Poison Control Center. If you develop symptoms of a poisonous scorpion sting, go to the nearest emergency care facility.
5. Keep your tetanus shots and boosters current.

## Fire Ants

Fire ants are aggressive, reddish-brown to black ants that are 1/8 inch to 1/4 inch long. They construct nests, which are often visible as dome-shaped mounds of soil, sometimes as large as 3 feet across and 1 1/2 feet in height. In sandy soils, mounds are flatter and less visible. Fire ants usually build mounds in sunny, open areas such as lawns, pastures, cultivated fields and meadows, but they are not restricted to these areas. Mounds or nests may be located in rotting logs, around trees and stumps, under pavement and buildings, and occasionally indoors.

Fire ants use their stingers to immobilize or kill prey and to defend ant mounds from disturbance by larger animals, such as humans. Any disturbance sends hundreds of workers out to attack anything that moves. The ant grabs its victim with its mandibles (mouthparts) and then inserts its stinger. The process of stinging releases a chemical, which alerts other ants, inducing them to sting. In addition, one ant can sting several times without letting go with its mandibles.

Once stung, humans experience a sharp pain that lasts a couple of minutes, then after a while the sting starts itching and a welt appears. Fire ant venom contains alkaloids and a relatively small amount of protein. The alkaloids kill skin cells; this attracts white blood cells, which form a pustule within a few hours of being stung. The fluid in the pustule is sterile, but if the pustule is broken, the wound may become infected. The protein in the venom can cause allergic reactions that may require medical attention.

Some of the factors related to stinging insects that increase the risk associated with accidental contact are:

- The nests for these insects are frequently found in remote wooded or grassy areas and hidden in cavities
- The nests can be situated in trees, rocks, bushes or in the ground, and are usually difficult to see
- Accidental contact with these insects is highly probable, especially during warm weather conditions when the insects are most active
- If a site worker accidentally disturbs a nest, the worker may be inflicted with multiple stings, causing extreme pain and swelling which can leave the worker incapacitated and in need of medical attention
- Some people are hypersensitive to the toxins injected by a sting, and when stung, experience a violent and immediate allergic reaction resulting in a life-threatening condition known as anaphylactic shock
- Anaphylactic shock manifests itself very rapidly and is characterized by extreme swelling of the body, eyes, face, mouth and respiratory passages
- The hypersensitivity needed to cause anaphylactic shock, can in some people, accumulate over time and exposure, therefore, even if someone has been stung previously, and not experienced an allergic reaction, there is no guarantee that they will not have an allergic reaction if they are stung again

With these things in mind, and with the high probability of contact with stinging insects, use the following safe work practices:

- If a worker knows that he is hypersensitive to bee, wasp or hornet stings, inform the site Safety officer of this condition prior to participation in site activities
- All site personnel will be watchful for the presence of stinging insects and their nests, and will advise the Site Safety officer if a stinging insect nest is located or suspected in the area
- Any nests located on site will be flagged off and site personnel will be notified of its presence
- If attacked, site personnel will immediately seek shelter and stay there. Do not jump in water (bees will still be in the area when you come up). Once safe, remove stings from your skin, it does not matter how you do it, but do it as quickly as possible to reduce the amount of venom they inject. Obtain first aid treatment and contact the safety officer who will observe for signs of allergic reaction

Treatment for fire ant stings is aimed at preventing secondary bacterial infection, which may occur if the pustule is scratched or broken. Clean the blisters with soap and water to prevent secondary infection. Do not break the blister. Topical corticosteroid ointments and oral antihistamines may relieve the itching associated with these reactions.

Site personnel with a known hypersensitivity to stinging insects will keep required emergency medication on or near their person at all times

## **Spiders**

A large variety of spiders may be encountered during site activities. Extreme caution must be used when lifting logs and debris, since spiders are typically found in these areas.

While most spider bites merely cause localized pain, swelling, reddening, and in some cases, tissue damage, there are a few spiders that, due to the severity of the physiological affects caused by their venom, are dangerous. The UXOSO will brief site personnel as to the identification and avoidance of these dangerous spiders. These species include the black widow and the brown or violin spiders.

The black widow is a coal-black bulbous spider 3/4 to 1 1/2 inches in length, with a bright red hourglass on the under side of the abdomen. The black widow is usually found in dark moist locations, especially under rocks, rotting logs and may even be found in outdoor toilets where they inhabit the underside of the seat. Victims of a black widow bite may exhibit the following signs or symptoms:

- Sensation of pinprick or minor burning at the time of the bite
- Appearance of small punctures (but sometimes none are visible)
- After 15 to 60 minutes, intense pain is felt at the site of the bite which spreads quickly, and is followed by profuse sweating, rigid abdominal muscles, muscle spasms, breathing difficulty, slurred speech, poor coordination, dilated pupils and generalized swelling of face and extremities

The brown or violin spider is brownish to tan in color, rather flat, 1/2 to 5/8 Spider inches long. However, unlike the typical species, the ones encountered at the former Fort Ord do not have a violin or “fiddle” shaped mark on the top of the head. Of the brown spider, there are three varieties found in the United States that present a problem to site personnel. These are the brown recluse, the desert violin and the



Arizona violin. These spiders may be found in a variety of locations including trees, rocks or in dark locations. Victims of a brown or violin spider bite may exhibit the following signs or symptoms:

- Blistering at the site of the bite, followed by a local burning at the site 30 to 60 minutes after the bite
- Formation of a large, red, swollen, postulating lesion with a bull's-eye appearance
- Systemic affects may include a generalized rash, joint pain, chills, fever, nausea and vomiting
- Pain may become severe after 8 hours, with the onset of tissue necrosis

There is no effective first aid treatment for either of these bites. Except for very young, very old or weak victims, spider bites are not considered to be life threatening. However, medical treatment must be sought to reduce the extent of damage caused by the injected toxins.

#### **Brown Recluse Spider**



#### **Black Widow Spider**



First aid should include:

- If possible, catch the spider to confirm its identity. Even if the body is crushed, save it for identification
- Clean the bitten area with soap and water or rubbing alcohol
- To relieve pain, place an ice pack over the bite
- Keep the victim quiet and monitor breathing

Seek immediate medical attention

## **Sensitivity Reaction to Insect Stings or Bites**

A sensitivity reaction is one of the more dangerous and acute effects of insect bites or stings. It is the most common cause of fatalities from bites, particularly from bees, wasps, and spiders. Anaphylactic shock due to stings can lead to severe reactions in the circulatory, respiratory, and central nervous system. This can also result in death.

Site personnel must be questioned regarding their allergic reaction to insect bites. Anyone knowingly allergic should be required to carry and know how to use a response kit. First aid providers must be instructed on how to use the kit also. The kit must be inspected to ensure it is updated.

Administer first aid and observe persons reporting stings for signs of allergic reaction, such as unusual swelling, nausea, dizziness, and shock. At the first sign of these symptoms, take the individual to a medical facility for attention.

## **Insect Borne Diseases**

Diseases that are spread by insects include the following: Rocky Mountain Spotted Fever or Lyme Disease (tick); Bubonic and other forms of Plague (fleas); Malaria, West Nile Virus and Equine Encephalitis (mosquito) and Leshmaniasis (Sand Flies)

## **Tick Borne Diseases**

Lyme disease is the second most rapidly spreading disease in the U.S.

### **Lyme Disease**

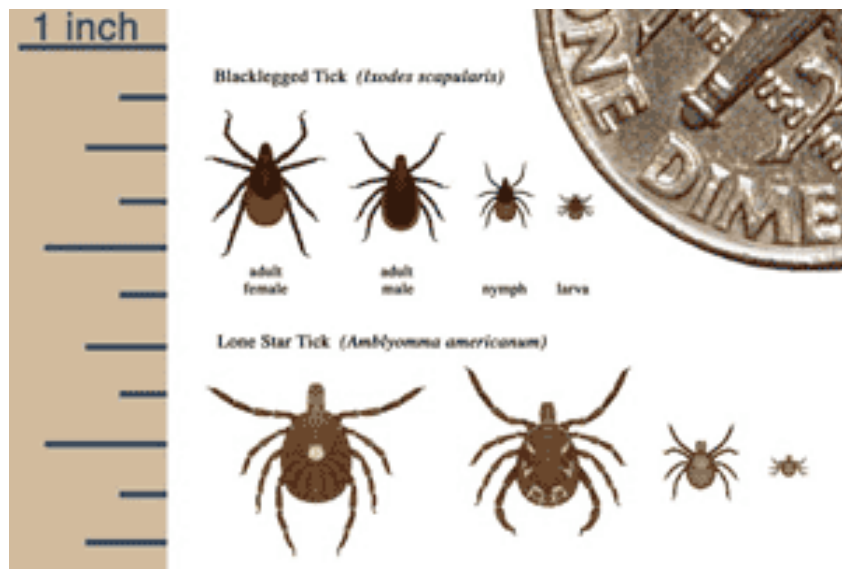
#### **1. Facts**

Definition:

- Bacterial infection transmitted by the bite of an infected black-legged tick more popularly known as the deer tick.
- Prevalence (nationwide and other countries).
- Three stages/sizes of deer ticks:
  - Larvae
  - Nymph
  - Adult

Tick season is May through October.

Not all ticks transmit Lyme disease (Black legged or deer tick [upper] compared to the Lone Star tick [lower])



- Ticks must be attached for several hours before Lyme disease can be transmitted.
- Being bitten by a tick does not mean you will get Lyme disease.

## 2. Prevention and Protection:

- Wear light-colored, tight-knit clothing.
- Wear long pants and long-sleeved shirts.
- Tuck pant legs into shoes or boots.
- Wear a hat.
- Use insect repellent containing DEET ((follow manufacturer's instructions for use).
- Check yourself daily for ticks after being in grassy, wooded areas.
- Request information from the Health and Safety Medical Section regarding Lyme Disease.

## 3. If Bitten:

- Remove the tick immediately with fine-tipped tweezers. Grasp the tick as close to the skin as possible. Pull gently but firmly without twisting or crushing the tick.
- Wash your hands and dab the bite with an antiseptic.
- Save the tick in a jar in some alcohol. Label the jar with the date of the bite, the area where you picked up the tick and the spot on your body where you were bitten.

- Monitor the bite for any signs of infection or rash.

#### 4. Symptoms:

Early Signs (may vary from person to person)

- Expanding skin rash.
- Flu-like symptoms during summer or early fall that include the following:
  - Chills, fever, headache, swollen lymph nodes.
  - Stiff neck, aching joints, and muscles.
  - Fatigue.
- Later signs
  - Nervous system problems.
  - Heart problems.
  - Arthritis, especially in knees.

#### 5. Upon Onset of Symptoms:

- Notify your Safety Officer (SO) and your supervisor.

### **Rocky Mountain Spotted Fever**

The Center for Disease Control (CDC) has noted the increase of Rocky Mountain Spotted Fever (RMSF) which is caused by bites from infected ticks that live in and near wooded areas, tall grass and brush.

RMSF has occurred in 36 states, with the heaviest concentrations in Oklahoma, North Carolina, South Carolina, and Virginia. Rocky Mountain spotted fever is the most severe and most frequently reported rickettsial illness in the United States. It also occurs in Mexico and in Central and South America. It is caused by Rocky Mountain Wood Ticks and Dog Ticks that have become infected with rickettsia. Both are black in color.

The disease is caused by *Rickettsia rickettsii*, a species of bacteria that is spread to humans by ixodid (hard) ticks.

Initial signs and symptoms of the disease include sudden onset of fever, headache, and muscle pain, followed by development of rash. The disease can be difficult to diagnose in the early stages, and without prompt and appropriate treatment it can be fatal.

Prevention procedures are the same as for Lyme disease.

## Ehrlichiosis

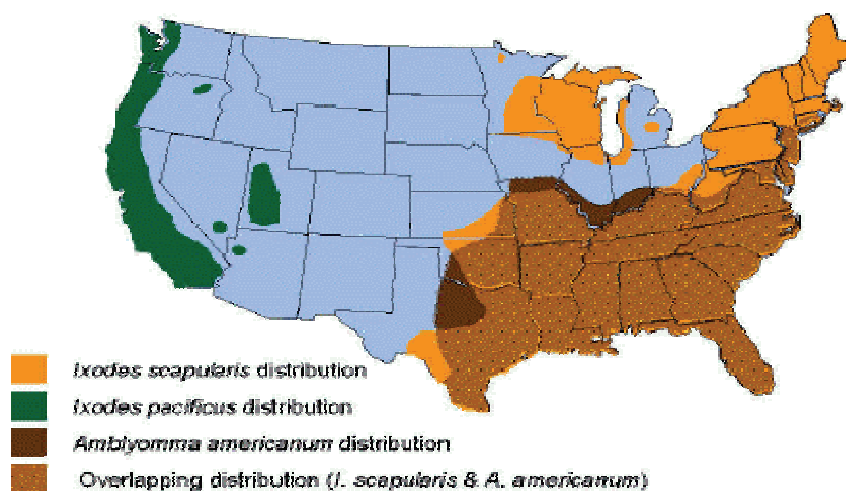
Ehrlichiosis is the general name used to describe several bacterial diseases that affect animals and humans. These diseases are caused by the organisms in the genus *Ehrlichia*. Worldwide, there are currently four ehrlichial species that are known to cause disease in humans.

In the United States, ehrlichiae are transmitted by the bite of an infected tick. The lone star tick (*Amblyomma americanum*), the blacklegged tick (*Ixodes scapularis*), and the western blacklegged tick (*Ixodes pacificus*) are known vectors of ehrlichiosis in the United States. *Ixodes ricinus* is the primary vector in Europe.

The symptoms of ehrlichiosis may resemble symptoms of various other infectious and non-infectious diseases. These clinical features generally include fever, headache, fatigue, and muscle aches. Other signs and symptoms may include nausea, vomiting, diarrhea, cough, joint pains, confusion, and occasionally rash. Symptoms typically appear after an incubation period of 5-10 days following the tick bite. It is possible that many individuals who become infected with ehrlichiae do not become ill or they develop only very mild symptoms.

Most cases of ehrlichiosis are reported within the geographic distribution of the vector ticks (see map below). Occasionally, cases are reported from areas outside the distribution of the tick vector. In most instances, these cases have involved persons who traveled to areas where the diseases are endemic, and who had been bitten by an infected tick and developed symptoms after returning home. Therefore, if you traveled to an ehrlichiosis-endemic area 2 weeks prior to becoming ill, you should tell your doctor where you traveled.

**Figure 20. Areas where human ehrlichiosis may occur based on approximate distribution of vector tick species**



A diagnosis of ehrlichiosis is based on a combination of clinical signs and symptoms and confirmatory laboratory tests. Blood samples can be sent to a reference laboratory for testing. However, the availability of the different types of laboratory tests varies considerably. Other laboratory findings indicative of ehrlichiosis include low white blood cell count, low platelet count, and elevated liver enzymes.

Ehrlichiosis is treated with a tetracycline antibiotic, usually doxycycline.

Very little is known about immunity to ehrlichial infections. Although it has been proposed that infection with ehrlichiae confers long-term protection against reinfection, there have been occasional reports of laboratory-confirmed reinfection. Short-term protection has been described in animals infected with some *Ehrlichia* species and this protection wanes after about 1 year. Clearly, more studies are needed to determine the extent and duration of protection against reinfection in humans.

Limiting exposure to ticks reduces the likelihood of infection in persons exposed to tick-infested habitats. Prompt careful inspection of your body and removal of crawling or attached ticks is an important method of preventing disease. It may take 24–48 hours of attachment before microorganisms are transmitted from the tick to you.

### **Preventive measures - Follow protection protocols for Lyme disease**

#### **Babesiosis**

Babesiosis is an intraerythrocytic parasitic infection caused by protozoa of the genus *Babesia* and transmitted through the bite of the *Ixodes* tick, the same vector responsible for transmission of Lyme disease. While most cases are tick-borne, transfusion and transplacental transmission have been reported. In the United States, babesiosis is usually an asymptomatic infection in healthy individuals. Several groups of patients become symptomatic, and, within these subpopulations, significant morbidity and mortality occur. The disease most severely affects patients who are elderly, immunocompromised, or asplenic. Among those symptomatically infected, the mortality rate is 10% in the United States and 50% in Europe.

The primary vectors of the parasite are ticks of the genus *Ixodes*. In the United States, the black-legged tick, *Ixodes scapularis* (also known as *Ixodes dammini*) is the primary vector for the parasite; in Europe, *Ixodes ricinus* appears to be the primary tick vector. In each location, the *Ixodes* tick vector for *Babesia* is the same vector that locally transmits *Borrelia burgdorferi*, the agent implicated in Lyme disease. The primary US animal reservoir is the white-footed mouse, *Peromyscus leucopus*. Additionally, white-tailed deer serve as transport hosts for the adult tick vector, *I. scapularis*. In Europe, the primary animal reservoir is cattle.

The Ixodid ticks ingest *Babesia* during feeding from the host, multiply the protozoa in their gut wall, and concentrate it in their salivary glands. The tick inoculates a new host when feeding again. The parasite then infects red blood cells (RBCs) and differentiated and undifferentiated trophozoites are produced. The former produce 2-4 merozoites that disrupt the RBC and go on to invade other RBCs. This leads to hemolytic anemia, thrombocytopenia, and atypical lymphocyte formation. Alterations in RBC membranes cause decreased conformability and increased red cell adherence, which can lead to development of acute respiratory distress syndrome (ARDS) among those severely affected.

The first US case of babesiosis was reported on Nantucket Island in 1966. An increasing trend over the past 30 years may be the result of restocking of the deer population, curtailment of hunting, and an increase in outdoor recreational activities. Between 1968 and 1993, more than 450 cases of *Babesia* infections were confirmed in the United States. However, the actual prevalence of this disease is unknown because most infected patients are asymptomatic.

The first case of human babesiosis was reported in 1957 from the former Yugoslavia in an asplenic farmer. Approximately 40 cases have been reported since then, mostly in Ireland, the United Kingdom, and France. Sporadic case reports of babesiosis in Japan, Korea, China, Mexico, South Africa, and Egypt have also been documented.

The signs and symptoms mimic malaria and range in severity from asymptomatic to septic shock.

Symptoms include: Generalized weakness, fatigue, depression, fever, anorexia and weight loss, CNS - Headache, photophobia, neck stiffness, altered sensorium, pulmonary - Cough, shortness of breath, GI - Nausea, vomiting, abdominal pain, Musculoskeletal - Arthralgia and myalgia and Renal - Dark urine

## **Prevention**

Prevention measures are the same as for Lyme and other insect borne diseases

## **Tularemia**

**Tularemia** (also known as "rabbit fever") is a serious infectious disease caused by the bacterium *Francisella tularensis*. The disease is endemic in North America, and parts of Europe and Asia. The primary vectors are ticks and deer flies, but the disease can also be spread through other arthropods. Animals such as rabbits, prairie dogs, hares and muskrats serve as reservoir hosts. The disease is named after Tulare County, California.

Depending on the site of infection, tularemia has six characteristic clinical syndromes: ulceroglandular, glandular, oropharyngeal, pneumonic, oculoglandular, and typhoidal.

The disease has a very rapid onset, with headache, fatigue, dizziness, muscle pains, loss of appetite and nausea. Face and eyes redden and become inflamed. Inflammation spreads to the lymph nodes, which enlarge and may suppurate (mimicking bubonic plague). Lymph node involvement is accompanied by a high fever. Death may result.

*Francisella tularensis* is one of the most infective bacteria known; fewer than ten organisms can cause disease leading to severe illness. The bacteria penetrate into the body through damaged skin and mucous membranes, or through inhalation. Humans are most often infected by tick bite or through handling an infected animal. Ingesting infected water, soil, or food can also cause infection. Tularemia can also be acquired by inhalation; hunters are at a higher risk for this

disease because of the potential of inhaling the bacteria during the skinning process. Tularemia is not spread directly from person to person.

No vaccine is available to the general public The best way to prevent tularemia infection is to wear rubber gloves when handling or skinning rodents or lagomorphs (as rabbits), avoid ingesting uncooked wild game and untreated water sources, and wearing long-sleeved clothes and using an insect repellent to prevent tick bites.

## Prevention

No vaccine is available to the general public The best way to prevent tularemia infection is to wear rubber gloves when handling or skinning rodents or lagomorphs (as rabbits), avoid ingesting uncooked wild game and untreated water sources, and wearing long-sleeved clothes and using an insect repellent to prevent tick bites.

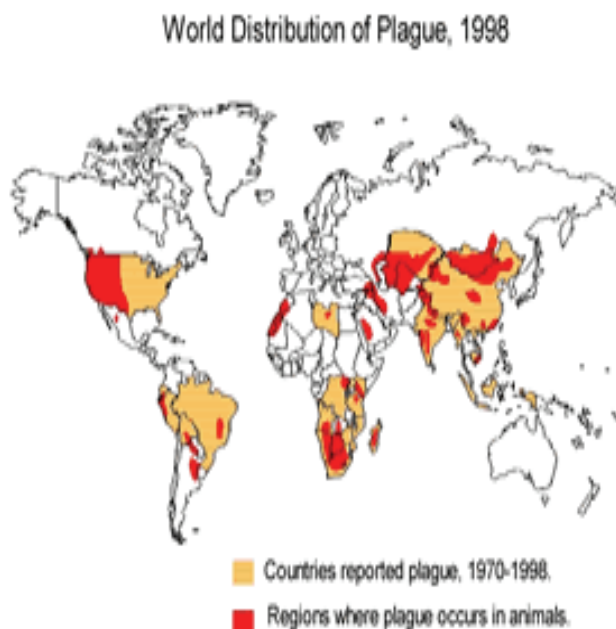
## Flea Borne Diseases

### Plague

- **Bubonic plague:** enlarged, tender lymph nodes, fever, chills and prostration
- **Septicemic plague:** fever, chills, prostration, abdominal pain, shock and bleeding into skin and other organs
- **Pneumonic plague:** fever, chills, cough and difficulty breathing; rapid shock and death if not treated early

**Introduction:** Plague is an infectious disease of animals and humans caused by a bacterium named *Yersinia pestis*.

People usually get plague from being bitten by a rodent flea that is carrying the plague bacterium or by handling an infected animal. Millions of people in Europe died from plague in the Middle Ages, when human homes and places of work were inhabited by flea-infested rats. Today, modern antibiotics are effective against plague, but if an infected person is not treated promptly, the disease is likely to cause illness or death.



**Risk:** Wild rodents in certain areas around the world are infected with plague. Outbreaks in people still occur in rural communities or in cities. They are usually associated with infected rats and rat fleas that live in the home. In the United States, the last urban plague epidemic occurred in Los Angeles in 1924-25. Since then, human plague in the United States has occurred as mostly scattered cases in rural areas (an average of 10 to 15 persons each year). Globally, the



World Health Organization reports 1,000 to 3,000 cases of plague every year. In North America, plague is found in certain animals and their fleas from the Pacific Coast to the Great Plains, and from southwestern Canada to Mexico. Most human cases in the United States occur in two regions: 1) northern New Mexico, northern Arizona, and southern Colorado; and 2) California, southern Oregon, and far western Nevada. Plague also exists in Africa, Asia, and South America (see map).

**Diagnosis:** The typical sign of the most common form of human plague is a swollen and very tender lymph gland, accompanied by pain. The swollen gland is called a "bubo." Bubonic plague should be suspected when a person develops a swollen gland, fever, chills, headache, and extreme exhaustion, and has a history of possible exposure to infected rodents, rabbits, or fleas.

A person usually becomes ill with bubonic plague 2 to 6 days after being infected. When bubonic plague is left untreated, plague bacteria invade the bloodstream. As the plague bacteria multiply in the bloodstream, they spread rapidly throughout the body and cause a severe and often fatal condition. Infection of the lungs with the plague bacterium causes the pneumonic form of plague, a severe respiratory illness. The infected person may experience high fever, chills, cough, and breathing difficulty and may expel bloody sputum. If plague patients are not given specific antibiotic therapy, the disease can progress rapidly to death. About 14% (1 in 7) of all plague cases in the United States are fatal.

## **Prevention and Control**

**Risk reduction:** Attempts to eliminate fleas and wild rodents from the natural environment in plague-infected areas are impractical. However, controlling rodents and their fleas around places where people live, work, and play is very important in preventing human disease. Therefore, preventive measures are directed to home, work, and recreational settings where the risk of acquiring plague is high. A combined approach using the following methods is recommended: environmental sanitation educating the public on ways to prevent plague exposures preventive antibiotic therapy

**Environmental Sanitation:** Effective environmental sanitation reduces the risk of persons being bitten by infectious fleas of rodents and other animals in places where people live, work, and recreate. It is important to remove food sources used by rodents and make homes, buildings, warehouses, or feed sheds rodent-proof. Applying chemicals that kill fleas and rodents is effective but should usually be done by trained professionals. Rats that inhabit ships and docks should also be controlled by trained professionals who can inspect and, if necessary, fumigate cargoes.

**Public Health Education:** In the western United States, where plague is widespread in wild rodents, people living, working, or playing where the infection is active face the greatest threat. Educating the general public and the medical community about how to avoid exposure to disease-bearing animals and their fleas is very important and should include the following preventive recommendations:

- Watch for plague activity in rodent populations where plague is known to occur. Report any observations of sick or dead animals to the local health department or law enforcement officials.
- Eliminate sources of food and nesting places for rodents around homes, work places, and recreation areas; remove brush, rock piles, junk, cluttered firewood, and potential-food supplies, such as pet and wild animal food. Make your home rodent-proof.
- If you anticipate being exposed to rodent fleas, apply insect repellents to clothing and skin, according to label instructions, to prevent flea bites. Wear gloves and tyvek coveralls when handling potentially infected animals.
- If you live in areas where rodent plague occurs, treat pet dogs and cats for flea control regularly and not allow these animals to roam freely.
- Health authorities may use appropriate chemicals to kill fleas at selected sites during animal plague outbreaks.

**Prophylactic (preventive) antibiotics:** Health authorities advise that antibiotics be given for a brief period to people who have been exposed to the bites of potentially infected rodent fleas (for example, during a plague outbreak) or who have handled an animal known to be infected with the plague bacterium. Such experts also recommend that antibiotics be given if a person has had close exposure to a person or an animal (for example, a house cat) with suspected plague pneumonia.

Persons who must be present in an area where a plague outbreak is occurring can protect themselves for 2 to 3 weeks by taking antibiotics. The preferred antibiotics for prophylaxis against plague are the tetracyclines or the sulfonamides.

### **Other diseases primarily transmitted by Arthropods (Ticks, mites, lice etc.)**

#### **Rickettsial Infections**

##### **Description**

Many species of *Rickettsia* can cause illnesses in humans (Table below). The term “rickettsiae” conventionally embraces a polyphyletic group of microorganisms in the class Proteobacteria, comprising species belonging to the genera *Rickettsia*, *Orientia*, *Ehrlichia*, *Anaplasma*, *Neorickettsia*, *Coxiella*, and *Bartonella*. These agents are usually not transmissible directly from person to person except by blood transfusion or organ transplantation, although sexual and placental transmission has been proposed for *Coxiella*. Transmission generally occurs via an infected arthropod vector or through exposure to an infected animal reservoir host.

Some of the diseases transmitted in this manner (Typhus, Rocky Mountain Spotted Fever, Q Fever, Ehrlichiosis:) are discussed in detail in this and other Biological Hazard FLDs. A summary of these diseases is included in Attachment 1.

**Typhus** (Not to be confused with Typhoid Fever [discussed in these FLDs])

*For the unrelated disease caused by Salmonella typhi, see Typhoid fever. For the unrelated disease caused by Salmonella paratyphi, please refer to Paratyphoid fever. For the monster of Greek mythology, see Typhus (monster).*

**Typhus** is any one of several similar diseases caused by louse-borne bacteria. The name comes from the Greek *typhos*, meaning smoky or lazy, describing the state of mind of those affected with typhus. *Rickettsia* is endemic in rodent hosts, including mice and rats, and spreads to humans through mites, fleas and body lice. The arthropod vector flourishes under conditions of poor hygiene, such as those found in prisons or refugee camps, amongst the homeless, or until the middle of the 20th century, in armies in the field. In tropical countries, typhus is often mistaken for dengue fever

### Epidemic typhus

Epidemic typhus (also called "Jail Fever", "Hospital Fever", "Ship fever", "Famine fever", "Petechial Fever", and "louse-borne typhus") is so named because the disease often causes epidemics following wars and natural disasters. The causative organism is *Rickettsia prowazekii*, transmitted by the human body louse (*Pediculus humanus corporis*). Feeding on a human who carries the bacillus infects the louse. *R. prowazekii* grows in the louse's gut and is excreted in its feces. The disease is then transmitted to an uninfected human who scratches the louse bite (which itches) and rubs the feces into the wound. The incubation period is one to two weeks. *R. prowazekii* can remain viable and virulent in the dried louse feces for many days. Typhus will eventually kill the louse, though the disease will remain viable for many weeks in the dead louse.

The symptoms set in quickly, and are among the most severe of the typhus family. They include severe headache, a sustained high fever, cough, rash, severe muscle pain, chills, falling blood pressure, stupor, sensitivity to light, and delirium. A rash begins on the chest about five days after the fever appears, and spreads to the trunk and extremities but does not reach the palms and soles. A symptom common to all forms of typhus is a fever which may reach 39°C (102°F).

The infection is treated with antibiotics. Intravenous fluids and oxygen may be needed to stabilize the patient. The mortality rate is 10% to 60%, but is vastly lower if antibiotics such as tetracycline are used early. Infection can also be prevented via vaccination. Brill-Zinsser disease is a mild form of epidemic typhus which recurs in someone after a long period of latency (similar to the relationship between chickenpox and shingles). This type of recurrence can also occur in immunosuppressed patients.

### Endemic typhu

Endemic typhus (also called "flea-borne typhus" and "murine typhus" or "rat flea typhus") is caused by the bacteria *Rickettsia typhi*, and is transmitted by the fleas that infest rats. Less often, endemic typhus is caused by *Rickettsia felis* and transmitted by fleas carried by cats or possums.

Symptoms of endemic typhus include headache, fever, chills, myalgia, nausea, vomiting, and cough.

Endemic typhus is highly treatable with antibiotics. Most people recover fully, but death may occur in the elderly, severely disabled or patients with a depressed immune system.

### **Scrub typhus**

Scrub typhus (also called "chigger-borne typhus") is caused by *Orientia tsutsugamushi* and transmitted by chiggers, which are found in areas of heavy scrub vegetation. Symptoms include fever, headache, muscle pain, cough, and gastrointestinal symptoms. More virulent strains of *O. tsutsugamushi* can cause hemorrhaging and intravascular coagulation.

#### **Prevention**

Limiting exposures to vectors or animal reservoirs remains the best means for reducing the risk for disease. Travelers and persons working in areas where organisms may be present should implement prevention based on avoidance of vector-infested habitats, use of repellents and protective clothing, prompt detection and removal of arthropods from clothing and skin, and attention to hygiene.

Typhus fever was categorized by the Center for Disease Control (CDC) as a Category B biological weapons agent. *Rickettsia prowazekii* is highly infectious and could be fatal but cannot be passed from person to person.

### **Encephalitis Arboviral Encephalitides**

#### **Perspectives**

Arthropod-borne viruses, i.e., arboviruses, are viruses that are maintained in nature through biological transmission between susceptible vertebrate hosts by blood feeding arthropods (mosquitoes, psychodids, ceratopogonids, and ticks). Vertebrate infection occurs when the infected arthropod takes a blood meal. The term 'arbovirus' has no taxonomic significance. Arboviruses that cause human encephalitis are members of three virus families: the *Togaviridae* (genus *Alphavirus*, *Flaviviridae*, and *Bunyaviridae*).

All arboviral encephalitides are zoonotic, being maintained in complex life cycles involving a nonhuman primary vertebrate host and a primary arthropod vector. These cycles usually remain undetected until humans encroach on a natural focus, or the virus escapes this focus via a secondary vector or vertebrate host as the result of some ecologic change. Humans and domestic animals can develop clinical illness but usually are "dead-end" hosts because they do not produce significant viremia, and do not contribute to the transmission cycle. Many arboviruses that cause encephalitis have a variety of different vertebrate hosts and some are transmitted by more than one vector. Maintenance of the viruses in nature may be facilitated by vertical transmission (e.g., the virus is transmitted from the female through the eggs to the offspring).

Arboviral encephalitides have a global distribution, but there are four main virus agents of encephalitis in the United States: eastern equine encephalitis (EEE), western equine encephalitis (WEE), St. Louis encephalitis (SLE) and La Crosse (LAC) encephalitis, all of which are transmitted by mosquitoes. Another virus, Powassan, is a minor cause of encephalitis in the northern United States, and is transmitted by ticks. A new Powassan-like virus has recently been isolated from deer ticks. Its relatedness to Powassan virus and its ability to cause disease has not been well documented. Most cases of arboviral encephalitis occur from June through September, when arthropods are most active. In milder (i.e., warmer) parts of the country, where arthropods are active late into the year, cases can occur into the winter months.

**There is expanded discussion of several of these diseases (West Nile and Eastern Equine Encephalitis elsewhere in this document. A more general discussion is found in Attachment 2.**

## Mosquito Borne Diseases

### Malaria

**Malaria** is a mosquito-borne disease caused by a parasite. Four kinds of malaria parasites can infect humans: *Plasmodium falciparum*, *P. vivax*, *P. ovale*, and *P. malariae*.



People with malaria often experience fever, chills, and flu-like illness. Left untreated, they may develop severe complications and die. Each year 350-500 million cases of malaria occur worldwide, and over one million people die, most of them young children in sub-Saharan Africa. Infection with any of the malaria species can make a person feel very ill; infection with *P. falciparum*, if not promptly treated, may be fatal. Although malaria can be a fatal disease, illness and death from malaria are largely preventable.

This sometimes fatal disease can be prevented and cured. Bed nets, insecticides, and anti-malarial drugs are effective tools to fight malaria in areas where it is transmitted. Travelers to a malaria-risk area should avoid mosquito bites and take a preventive anti-malarial drug. Malaria was eradicated from the United States in the early 1950s. However, malaria is common in many developing countries and travelers who visit these areas risk getting malaria.

Returning travelers and arriving immigrants could also reintroduce the disease in the United States if they are infected with malaria when they return. The mosquito that transmits malaria, *Anopheles*, is found throughout much of the United States. If local mosquitoes bite an infected person, those mosquitoes can, in turn, infect local residents (*introduced malaria*).

Because the malaria parasite is found in red blood cells, malaria can also be transmitted through blood transfusion, organ transplant, or the shared use of needles or syringes contaminated with blood. Malaria may also be transmitted from a mother to her fetus before or during delivery ("congenital" malaria).

Malaria is not transmitted from person to person like a cold or the flu. You cannot get malaria from casual contact with malaria-infected people.

### Prevention and control

You can prevent malaria by:

- keeping mosquitoes from biting you, especially at night
- taking anti-malarial drugs to kill the parasites
- eliminating places where mosquitoes breed
- spraying insecticides on walls to kill adult mosquitoes that come inside
- sleeping under bed nets - especially effective if they have been treated with insecticide,
- wearing insect repellent and long-sleeved clothing if out of doors at night

The surest way for you and your health-care provider to know whether you have malaria is to have a diagnostic test where a drop of your blood is examined under the microscope for the presence of malaria parasites. If you are sick and there is any suspicion of malaria (for example, if you have recently traveled in a malaria-risk area) the test should be performed without delay.

The disease should be treated early in its course, before it becomes severe and poses a risk to the patient's life. Several good anti-malarial drugs are available, and should be administered early on. The most important step is to think about malaria, so that the disease is diagnosed and treated in time.

### **West Nile Virus**

West Nile virus (WNV) is a potentially serious illness. Experts believe WNV is established as a seasonal epidemic in North America that flares up in the summer and continues into the fall. This fact sheet contains important information that can help you recognize and prevent WNV.

The easiest and best way to avoid WNV is to prevent mosquito bites.

- When you are outdoors, use insect repellent containing an EPA-registered active ingredient. Follow the directions on the package.
- Many mosquitoes are most active at dusk and dawn. Be sure to use insect repellent and wear long sleeves and pants at these times or consider staying indoors during these hours.
- Make sure you have good screens on your windows and doors to keep mosquitoes out.
- Get rid of mosquito breeding sites by emptying standing water from buckets, barrels and drainage ditches.

About one in 150 people infected with WNV will develop severe illness. The severe symptoms can include high fever, headache, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, vision loss, numbness and paralysis. These symptoms may last several weeks, and neurological effects may be permanent.

Up to 20 percent of the people who become infected have symptoms such as fever, headache, and body aches, nausea, vomiting, and sometimes swollen lymph glands or a skin rash on the

chest, stomach and back. Symptoms can last for as short as a few days, though even healthy people have become sick for several weeks.

Approximately 80 percent of people (about 4 out of 5) who are infected with WNV will not show any symptoms at all.

Most often, WNV is spread by the bite of an infected mosquito. Mosquitoes become infected when they feed on infected birds. Infected mosquitoes can then spread WNV to humans and other animals when they bite.

In a very small number of cases, WNV also has been spread through blood transfusions, organ transplants, breastfeeding and even during pregnancy from mother to baby.

WNV is not spread through casual contact such as touching or kissing a person with the virus.

Symptoms typically develop between 3 - 14 days after being bitten by an infected mosquito.

There is no specific treatment for WNV infection. In cases with milder symptoms, people experience symptoms such as fever and aches that pass on their own, although even healthy people have become sick for several weeks. In more severe cases, people usually need to go to the hospital where they can receive supportive treatment including intravenous fluids, help with breathing and nursing care.

Milder WNV illness improves on its own, and people do not necessarily need to seek medical attention for this infection though they may choose to do so. If you develop symptoms of severe WNV illness, such as unusually severe headaches or confusion, seek medical attention immediately. Severe WNV illness usually requires hospitalization. Pregnant women and nursing mothers are encouraged to talk to their doctor if they develop symptoms that could be WNV. People over the age of 50 are more likely to develop serious symptoms of WNV if they do get sick and should take special care to avoid mosquito bites.

The more time you're outdoors, the more time you could be bitten by an infected mosquito. Pay attention to avoiding mosquito bites if you spend a lot of time outside, either working or playing.

All donated blood is checked for WNV before being used. The risk of getting WNV through blood transfusions and organ transplants is very small, and should not prevent people who need surgery from having it. If you have concerns, talk to your doctor.

## **Equine Encephalitis**

Eastern equine encephalitis (EEE) is a mosquito-borne viral disease. EEE virus (EEEV) occurs in the eastern half of the United States where it causes disease in humans, horses, and some bird species. Because of the high mortality rate, EEE is regarded as one of the most serious mosquito-borne diseases in the United States.

EEEV is transmitted to humans through the bite of an infected mosquito. It generally takes from



3 to 10 days to develop symptoms of EEE after being bitten by an infected mosquito. The main EEEV transmission cycle is between birds and mosquitoes.

Many species of mosquitoes can become infected with EEEV. The most important mosquito species in maintaining the bird-mosquito transmission cycle is *Culiseta melanura*, which reproduces in freshwater hardwood swamps. *Culiseta melanura*, however, is not considered to be an important vector of EEEV to horses or humans because it feeds almost exclusively on birds.

Transmission to horses or humans requires mosquito species capable of creating a “bridge” between infected birds and uninfected mammals such as some *Aedes*, *Coquillettidia*, and *Culex* species.

Horses are susceptible to EEE and some cases are fatal. EEEV infections in horses, however, are not a significant risk factor for human infection because horses are considered to be “dead-end” hosts for the virus (i.e., the amount of EEEV in their bloodstreams is usually insufficient to infect mosquitoes).

Eastern equine encephalitis virus is a member of the family Togaviridae, genus *Alphavirus* closely related to Western equine encephalitis virus and Venezuelan equine encephalitis virus

Many persons infected with EEEV have no apparent illness. In those persons who do develop illness, symptoms range from mild flu-like illness to inflammation of the brain, coma and death.

The mortality rate from EEE is approximately one-third, making it one of the most deadly mosquito-borne diseases in the United States.

There is no specific treatment for EEE; optimal medical care includes hospitalization and supportive care (for example, expert nursing care, respiratory support, prevention of secondary bacterial infections, and physical therapy, depending on the situation).

Approximately half of those persons who survive EEE will have mild to severe permanent neurologic damage.

Incidence rate includes:

- Approximately 220 confirmed cases in the US 1964-2004, Average of 5 cases/year, with a range from 0-15 cases
- States with largest number of cases are Florida, Georgia, Massachusetts, and New Jersey.
- EEEV transmission is most common in and around freshwater hardwood swamps in the Atlantic and Gulf Coast states and the Great Lakes region.
- Human cases occur relatively infrequently, largely because the primary transmission cycle takes place in and around swampy areas where human populations tend to be limited.

## Risk Groups:

- Residents of and visitors to endemic areas (areas with an established presence of the virus)
- People who engage in outdoor work and recreational activities in endemic areas.
- Persons over age 50 and younger than age 15 seem to be at greatest risk for developing severe EEE when infected with the virus.

## Prevention

- A vaccine is available to protect equines.
- People should avoid mosquito bites by employing personal and workplace protection measures, such as using an EPA-registered repellent according to manufacturers' instructions, wearing protective clothing, avoiding outdoor activity when mosquitoes are active (some bridge vectors of EEEV are aggressive day-biters), and removing standing water that can provide mosquito breeding sites.
- There are laboratory tests to diagnosis EEEV infection including serology, especially IgM testing of serum and cerebrospinal fluid (CSF), and neutralizing antibody testing of acute- and convalescent-phase serum.

## Yellow Fever

Yellow fever is an acute viral disease. It is an important cause of hemorrhagic illness in many African and South American countries despite existence of an effective vaccine. The *yellow* refers to the jaundice symptoms that affect some patients.

Yellow fever is caused by an arbovirus of the family Flaviviridae, a positive single-stranded RNA virus. Human infection begins after deposition of viral particles through the skin in infected arthropod saliva. The mosquitos involved are *Aedes simpsoni*, *A. africanus*, and *A. aegypti* in Africa, the *Haemagogus* genus in South America.

The virus remains silent in the body during an incubation period of three to six days. There are then two disease phases. While some infections have no symptoms the first, *acute* phase is normally characterized by fever, muscle pain (with prominent backache), headache, shivers, loss of appetite, and nausea or vomiting. The high fever is often paradoxically associated with a slow pulse (known as Faget's sign). After three or four days most patients improve and their symptoms disappear.

Fifteen percent of patients, however, enter a *toxic phase* within 24 hours. Fever reappears and several body systems are affected. The patient rapidly develops jaundice and complains of abdominal pain with vomiting. Bleeding can occur from the mouth, nose, eyes, and stomach. Once this happens, blood appears in the vomit and feces. Kidney function deteriorates; this can range from abnormal protein levels in the urine (proteinuria) to complete kidney failure with no

urine production (anuria). Half of the patients in the "toxic phase" die within fourteen days. The remainder recover without significant organ damage.

Yellow fever is difficult to recognize, especially during the early stages. It can easily be confused with malaria, typhoid, rickettsial diseases, haemorrhagic viral fevers (e.g. Lassa), arboviral infections (e.g. dengue), leptospirosis, viral hepatitis and poisoning (e.g. carbon tetrachloride). A laboratory analysis is required to confirm a suspect case.

## **Prevention**

There is a vaccine for yellow fever that gives a ten-year or more immunity from the disease and effectively protects people traveling to affected areas. The vaccination may be required for entry to some countries, however, the vaccine may be contra-indicated for person over 60 years of age.

Use precautions as for other mosquito borne diseases. Avoid mosquito bites by employing personal and workplace protection measures, such as using an EPA-registered repellent according to manufacturers' instructions, wearing protective clothing, avoiding outdoor activity when mosquitoes are active and removing standing water that can provide mosquito breeding sites.

## **Meningitis**

Meningitis is a viral disease that can affect the central nervous system.

Meningitis is encountered in agricultural regions of Asia.

Meningitis is transmitted through the bite from an infected mosquito.

Symptoms can be nonexistent or severe and flu-like, with fever, chills, tiredness, headache, nausea and vomiting. If not treated promptly the disease can be fatal.

## **Prevention**

- A vaccine is available. It's 80% effective after a single dose and 97.5% effective after a second dose.

Use precautions as for other mosquito borne diseases. Avoid mosquito bites by employing personal and workplace protection measures, such as using an EPA-registered repellent according to manufacturers' instructions, wearing protective clothing, avoiding outdoor activity when mosquitoes are active and removing standing water that can provide mosquito breeding sites.

## Sand Flies

### Leishmaniasis



Sand Fly and Mosquito



Sand Fly

Leishmaniasis (LEASH-ma-NIGH-a-sis) is a parasitic disease spread by the bite of infected sand flies. There are several different forms of leishmaniasis. The most common forms are **cutaneous leishmaniasis**, which causes skin sores, and **visceral leishmaniasis**, which affects some of the internal organs of the body (for example, spleen, liver, bone marrow).

People who have cutaneous leishmaniasis have one or more sores on their skin. The sores can change in size and appearance over time. They often end up looking somewhat like a volcano, with a raised edge and central crater. Some sores are covered by a scab. The sores can be painless or painful. Some people have swollen glands near the sores (for example, under the arm if the sores are on the arm or hand).

People who have visceral leishmaniasis usually have fever, weight loss, and an enlarged spleen and liver (usually the spleen is bigger than the liver). Some patients have swollen glands. Certain blood tests are abnormal. For example, patients usually have low blood counts, including a low red blood cell count (anemia), low white blood cell count, and low platelet count.

The number of new cases of cutaneous leishmaniasis each year in the world is thought to be about 1.5 million. The number of new cases of visceral leishmaniasis is thought to be about 500,000.

Leishmaniasis is found in parts of about 88 countries. Approximately 350 million people live in these areas. Most of the affected countries are in the tropics and subtropics. The settings in which leishmaniasis is found range from rain forests in Central and South America to deserts in West Asia. More than 90 percent of the world's cases of visceral leishmaniasis are in India, Bangladesh, Nepal, Sudan, and Brazil.

Leishmaniasis is found in some parts of the following areas:

- in Mexico, Central America, and South America -- from northern Argentina to Texas (not in Uruguay, Chile, or Canada)
- southern Europe (leishmaniasis is not common in travelers to southern Europe)
- Asia (not Southeast Asia)
- the Middle East
- Africa (particularly East and North Africa, with some cases elsewhere)

Leishmaniasis is not found in Australia or Oceania (that is, islands in the Pacific, including Melanesia, Micronesia, and Polynesia).

It is possible but very unlikely that you would get leishmaniasis in the United States. Very rarely, people living in Texas have developed skin sores from cutaneous leishmaniasis.

No cases of visceral leishmaniasis are known to have been acquired in the United States.

Leishmaniasis is spread by the bite of some types of phlebotomine sand flies. Sand flies become infected by biting an infected animal (for example, a rodent or dog) or person. Since sand flies do not make noise when they fly, people may not realize they are present. Sand flies are very small and may be hard to see; they are only about one-third the size of typical mosquitoes. Sand flies usually are most active in twilight, evening, and night-time hours (from dusk to dawn). Sand flies are less active during the hottest time of the day. However, they will bite if they are disturbed, such as when a person brushes up against the trunk of a tree where sand flies are resting. Rarely, leishmaniasis is spread from a pregnant woman to her baby. Leishmaniasis also can be spread by blood transfusions or contaminated needles.

People of all ages are at risk for leishmaniasis if they live or travel where leishmaniasis is found. Leishmaniasis usually is more common in rural than urban areas; but it is found in the outskirts of some cities. The risk for leishmaniasis is highest from dusk to dawn because this is when sand flies are the most active. All it takes to get infected is to be bitten by one infected sand fly. This is more likely to happen the more people are bitten, that is, the more time they spend outside in rural areas from dusk to dawn.

People with cutaneous leishmaniasis usually develop skin sores within a few weeks (sometimes as long as months) of when they were bitten.

People with visceral leishmaniasis usually become sick within several months (rarely as long as years) of when they were bitten.

The skin sores of cutaneous leishmaniasis will heal on their own, but this can take months or even years. The sores can leave ugly scars. If not treated, infection that started in the skin rarely spreads to the nose or mouth and causes sores there (**mucosal leishmaniasis**). This can happen with some of the types of the parasite found in Central and South America. Mucosal leishmaniasis might not be noticed until years after the original skin sores healed. The best way to prevent mucosal leishmaniasis is to treat the cutaneous infection before it spreads.

If not treated, visceral leishmaniasis can cause death. It is very rare for travelers to get visceral leishmaniasis.

If you think you might have leishmaniasis, report to your Safety Officer to ensure appropriate follow-up. The first step is to find out if you have traveled to a part of the world where leishmaniasis is found. The health care provider will ask you about any signs or symptoms of leishmaniasis you may have, such as skin sores that have not healed. If you have skin sores, the health care provider will likely want to take some samples directly from the sores. These samples can be examined for the parasite under a microscope, in cultures, and through other means. A blood test for detecting antibody (immune response) to the parasite can be helpful, particularly for cases of visceral leishmaniasis. However, tests to look for the parasite itself should also be done. Diagnosing leishmaniasis can be difficult. Sometimes the laboratory tests are negative even if a person has leishmaniasis.

The health care provider can talk with CDC staff about whether a case of leishmaniasis should be treated, and, if so, how. Most people who have cutaneous leishmaniasis do not need to be hospitalized during their treatment.

## **Prevention**

The best way prevent leishmaniasis is by protecting against sand fly bites. Vaccines and drugs for preventing infection are not yet available. To decrease risk of being bitten:

- Stay in well-screened or air-conditioned areas as much as possible. Avoid outdoor activities, especially from dusk to dawn, when sand flies are the most active.
- When outside, wear long-sleeved shirts, long pants, and socks. Tuck your shirt into your pants.
- Apply insect repellent on uncovered skin and under the ends of sleeves and pant legs. Follow the instructions on the label of the repellent. The most effective repellents are those that contain the chemical DEET (N,N-diethylmetatoluamide). The concentration of DEET varies among repellents. Repellents with DEET concentrations of 30-35% are quite effective, and the effect should last about 4 hours. Lower concentrations should be used for children (no more than 10% DEET). Repellents with DEET should be used sparingly on children from 2 to 6 years old and not at all on children less than 2 years old.
- Spray clothing with permethrin-containing insecticides. The insecticide should be reapplied after every five washings.
- Spray living and sleeping areas with an insecticide to kill insects.
- If you are not sleeping in an area that is well screened or air-conditioned, use a bed net and tuck it under your mattress. If possible, use a bed net that has been soaked in or sprayed with permethrin. The permethrin will be effective for several months if the bed net is not washed. Keep in mind that sand flies are much smaller than mosquitoes and therefore can get through

smaller holes. Fine-mesh netting (at least 18 holes to the inch; some sources say even finer) is needed for an effective barrier against sand flies. This is particularly important if the bed net has not been treated with permethrin. However, it may be uncomfortable to sleep under such a closely woven bed net when it is hot.

**NOTE:** Bed nets, repellents containing DEET, and permethrin may need to be purchased before traveling and can be found in hardware, camping, and military surplus stores.

**Deer Flies (See Tularemia above)**

**ATTACHMENT 1**

**RICKETTSIAL INFECTIONS**



## **Rickettsial Infections**

### **Description**

Many species of *Rickettsia* can cause illnesses in humans (Table below). The term “rickettsiae” conventionally embraces a polyphyletic group of microorganisms in the class Proteobacteria, comprising species belonging to the genera *Rickettsia*, *Orientia*, *Ehrlichia*, *Anaplasma*, *Neorickettsia*, *Coxiella*, and *Bartonella*. These agents are usually not transmissible directly from person to person except by blood transfusion or organ transplantation, although sexual and placental transmission has been proposed for *Coxiella*. Transmission generally occurs via an infected arthropod vector or through exposure to an infected animal reservoir host. However, sennetsu fever is acquired following consumption of raw fish products. The clinical severity and duration of illnesses associated with different rickettsial infections vary considerably, even within a given antigenic group. Rickettsioses range in severity from diseases that are usually relatively mild (rickettsialpox, cat scratch disease, and African tick-bite fever) to those that can be life-threatening (epidemic and murine typhus, Rocky Mountain spotted fever, scrub typhus and Oroya fever), and they vary in duration from those that can be self-limiting to chronic (Q fever and bartonellosis) or recrudescent (Brill-Zinsser disease). Most patients with rickettsial infections recover with timely use of appropriate antibiotic therapy.

Travelers may be at risk for exposure to agents of rickettsial diseases if they engage in occupational or recreational activities which bring them into contact with habitats that support the vectors or animal reservoir species associated with these pathogens.

The geographic distribution and the risks for exposure to rickettsial agents are described below and in the Table below.

### **Epidemic Typhus and Trench Fever**

Epidemic typhus and trench fever, which are caused by *Rickettsia prowazkei* and *Bartonella quintana*, respectively, are transmitted from one person to another by the human body louse. Contemporary outbreaks of both diseases are rare in most developed countries and generally occur only in communities and populations in which body louse infestations are frequent, especially during the colder months when louse-infested clothing is not laundered. Foci of trench fever have also been recognized among homeless populations in urban centers of industrialized countries. Travelers who are not at risk of exposure to body lice or to persons with lice are unlikely to acquire these illnesses. However, health-care workers who care for these patients may be at risk for acquiring louse-borne illnesses through inhalation or inoculation of infectious louse feces into the skin or conjunctiva. In the eastern United States, campers, inhabitants of wooded areas, and wildlife workers can acquire sylvatic epidemic typhus if they come in close contact with flying squirrels, their ectoparasites, or their nests, which can be made in houses, cabins, and tree-holes.

## Murine Typhus and Cat-Flea Rickettsiosis

Murine typhus, which is caused by infection with *Rickettsia typhi*, is transmitted to humans by rat fleas, particularly during exposure in rat-infested buildings (3). Flea-infested rats can be found throughout the year in humid tropical environments, especially in harbor or riverine environments. In temperate regions, they are most common during the warm summer months. Similarly, cat-flea rickettsiosis, which is caused by infection with *Rickettsia felis*, occurs worldwide from exposure to flea-infested domestic cats and dogs, as well as peridomestic animals, and is responsible for a murine typhus-like febrile disease in humans.

## Scrub Typhus

Mites (“chiggers”) transmit *Orientia tsutsugamushi*, the agent of scrub typhus, to humans. These mites occur year-round in a large area from South Asia to Australia and in much of East Asia, including Japan, China, Korea, Maritime Provinces and Sakhalin Island of Russia, and Tajikistan. Their prevalence, however, fluctuates with temperature and rainfall. Infection may occur on coral atolls in both the Indian and Pacific Oceans, in rice paddies and along canals and fields, on oil palm plantations, in tropical to desert climates and in elevated river valleys. Humans typically encounter the arthropod vector of scrub typhus in recently disturbed habitat (e.g., forest clearings) or other persisting mite foci infested with rats and other rodents.

## Tick-Borne Rickettsioses

Tick-borne rickettsial diseases are most common in temperate and subtropical regions. These diseases include numerous well-known classical spotted fever rickettsioses and an expanding group of newly recognized diseases (Table below). In general, peak transmission of tick-borne rickettsial pathogens occurs during spring and summer months. Travelers who participate in outdoor activities in grassy or wooded areas (e.g., trekking, camping, or going on safari) may be at risk for acquiring tick-borne illnesses, including those caused by *Rickettsia*, *Anaplasma*, and *Ehrlichia* species (see below).

**TABLE Epidemiologic features and symptoms of rickettsial diseases**

ANTIGENIC GROUP	DISEASE	AGENT	PREDOMINANT SYMPTOMS*	VECTOR OR ACQUISITION MECHANISM	ANIMAL RESERVOIR	GEOGRAPHIC DISTRIBUTION OUTSIDE THE US
Typhus fevers	Epidemic typhus, Sylvatic typhus	<i>Rickettsia prowazekii</i>	Headache, chills, fever, prostration, confusion, photophobia, vomiting, rash (generally starting on trunk)	Human body louse, squirrel flea and louse	Humans, flying squirrels (US)	Cool mountainous regions of Africa, Asia, and Central and South America
	Murine typhus	<i>R. typhi</i>	As above, generally less severe	Rat flea	Rats, mice	Worldwide
Spotted fevers	African tickbite fever	<i>R. africae</i>	Fever, eschar(s), regional adenopathy,	Tick	Rodents	Sub-Saharan Africa

ANTIGENIC GROUP	DISEASE	AGENT	PREDOMINANT SYMPTOMS*	VECTOR OR ACQUISITION MECHANISM	ANIMAL RESERVOIR	GEOGRAPHIC DISTRIBUTION OUTSIDE THE US
			maculopapular or vesicular rash subtle or absent			
	Aneruptive fever	<i>R. helvetica</i>	Fever, headache, myalgia	Tick	Rodents	Old World
	Australian spotted fever	<i>R. marmionii</i>	Fever, eschar, maculopapular or vesicular rash, adenopathy	Tick	Rodents, reptiles	Australia
	Cat flea rickettsiosis	<i>R. felis</i>	As murine typhus, generally less severe	Cat and dog fleas	Domestic cats, opossums	Europe, South America
	Far Eastern spotted fever	<i>R. heilongjiangensis</i>	Fever, eschar, macular or maculopapular rash, lymphadenopathy, enlarged lymph nodes	Tick	Rodents	Far East of Russia, Northern China
	Flinders Island spotted fever, Thai tick typhus	<i>R. honei</i>	Mild spotted fever, eschar and adenopathy are rare	Tick	Not defined	Australia, Thailand
	Lymphangitis associated rickettsiosis	<i>R. sibirica</i> subsp. <i>mongolotimonae</i>	Fever, multiple eschars, regional adenopathy and lymphangitis, maculopapular rash	Tick	Rodents	Southern France, Portugal, Asia, Africa
	Maculatum infection	<i>R. parkeri</i>	Fever, eschar, rash maculopapular to vesicular	Tick	Rodents	Brazil, Uruguay
	Mediterranean spotted fevers‡	<i>R. conorii</i>	Fever, eschar, regional adenopathy, maculopapular rash on extremities	Tick	Dogs, rodents	Africa, India, Europe, Middle East, Mediterranean
	North Asian tick typhus	<i>R. sibirica</i>	Fever, eschar(s), regional adenopathy, maculopapular rash	Tick	Rodents	Russia, China, Mongolia
	Oriental spotted fever	<i>R. japonica</i>	As above	Tick	Rodents	Japan
	Queensland tick	<i>R. australis</i>	Fever, eschar,	Tick	Not defined	Australia,

ANTIGENIC GROUP	DISEASE	AGENT	PREDOMINANT SYMPTOMS*	VECTOR OR ACQUISITION MECHANISM	ANIMAL RESERVOIR	GEOGRAPHIC DISTRIBUTION OUTSIDE THE US
	typhus		regional adenopathy, rash on extremities			Tasmania
	Rickettsialpox	<i>R. akari</i>	Fever, eschar, adenopathy, disseminated vesicular rash	Mite	House mice	Russia, South Africa, Korea, Turkey, Balkan countries
	Rocky Mountain spotted fever, Sao Paulo exanthematic typhus, Minas Gerais exanthematic typhus, Brazilian spotted fever	<i>R. rickettsii</i>	Headache, fever, abdominal pain, macular rash progressing into papular or petechial (generally starting on extremities)	Tick	Rodents	Mexico, Central, and South America
	Tick-borne lymphadenopathy (TIBOLA), Dermacentor-borne necrosis and lymphadenopathy (DEBONEL)	<i>R. slovaca</i>	Necrosis erythema, cervical lymphadenopathy and enlarged lymph nodes, rare maculopapular rash	Tick	Lagomorphs, rodents	Europe, Asia
	Unnamed rickettsiosis	<i>R. aeschlimannii</i>	Fever, eschar, maculopapular rash	Tick	Domestic and wild animals	Africa
Orientia	Scrub typhus	<i>Orientia tsutsugamushi</i>	Fever, headache, sweating, conjunctival injection, adenopathy, eschar, rash (starting on trunk), respiratory distress	Mite	Rodents	South, Central, Eastern, and Southeast Asia and Australia
Coxiella	Q fever	<i>Coxiella burnetii</i>	Fever, headache, chills, sweating, pneumonia, hepatitis, endocarditis	Most human infections are acquired by inhalation of infectious aerosols; tick	Goats, sheep, cattle, domestic cats, other	Worldwide

ANTIGENIC GROUP	DISEASE	AGENT	PREDOMINANT SYMPTOMS*	VECTOR OR ACQUISITION MECHANISM	ANIMAL RESERVOIR	GEOGRAPHIC DISTRIBUTION OUTSIDE THE US
Bartonella	Cat-scratch disease	<i>Bartonella henselae</i>	Fever, adenopathy, neuroretinitis, encephalitis	Cat flea	Domestic cats	Worldwide
	Trench fever	<i>B. quintana</i>	Fever, headache, pain in shins, splenomegaly, disseminated rash	Human body louse	Humans	Worldwide
	Oroya fever	<i>B. bacilliformis</i>	Fever, headache, anemia, shifting joint and muscle pain, nodular dermal eruption	Sand fly	Unknown	Peru, Ecuador, Colombia
Ehrlichia	Ehrlichiosis	<i>Ehrlichia chaffeensis</i> <sup>#</sup>	Fever, headache, nausea, occasionally rash	Tick	Various large and small mammals, including deer and rodents	Worldwide
Anaplasma	Anaplasmosis	<i>Anaplasma phagocytophilum</i> <sup>#</sup>	Fever, headache, nausea, occasionally rash	Tick	Small mammals, and rodents	Europe, Asia, Africa
Neorickettsia	Sennetsu fever	<i>Neorickettsia sennetsu</i>	Fever, chills, headache, sore throat, insomnia	Fish, fluke	Fish	Japan, Malaysia

This represents only a partial list of symptoms. Patients may have different symptoms or only a few of those listed.

‡ Includes 4 different subspecies that can be distinguished serologically and by PCR assay, and respectively are the etiologic agents of Boutonneuse fever and Mediterranean tick fever in Southern Europe and Africa (*R. conorii* subsp. *conorii*), Indian tick typhus in South Asia (*R. conorii* subsp. *indica*), Israeli tick typhus in Southern Europe and Middle East (*R. conorii* subsp. *israelensis*), and Astrakhan spotted fever in the North Caspian region of Russia (*R. conorii* subsp. *caspiæ*).

# Organisms antigenically related to these species are associated with ehrlichial diseases outside the continental United States.

## Rickettsialpox

Rickettsialpox is generally an urban, mite-vector disease associated with *R. akari*-infected house mice, although feral rodent-mite reservoirs also have been described (3). Outbreaks of this illness have occurred shortly after rodent extermination programs or natural viral infections that depleted rodent populations and caused the mites to seek new hosts. *R. akari*-infected rodents have been found in urban centers in the former Soviet Union, South Africa, Korea, Croatia, and the United States. Travelers may be at risk for exposure to rodent mites when staying in old urban hostels and cabins.

## **Anaplasmosis and Ehrlichiosis**

Human ehrlichiosis and anaplasmosis are acute tick-borne diseases, associated with the lone star tick, *Amblyomma americanum*, and *Ixodes* ticks, respectively. Because one tick may be infected with more than one tick-borne pathogen (e.g. *Borrelia burgdorferi*, the causative agent of Lyme disease, or various *Babesia* species, agent of human babesiosis), patients may present with atypical clinical symptoms that complicate treatment. Ehrlichiosis and anaplasmosis are characterized by infection of different types of leukocytes, where the causative agent multiplies in cytoplasmic membrane-bound vacuole called morulae. Morulae can sometimes be detected in Giemsa-stained blood smears.

## **Q FEVER**

Q fever occurs worldwide, most often in persons who have contact with infected goat, sheep, cat and cattle, particularly parturient animals (especially farmers, veterinarians, butchers, meat packers, and seasonal workers). Travelers who visit farms or rural communities can be exposed to *Coxiella burnetii*, the agent of Q fever, through airborne transmission (via animal-contaminated soil and dust) or less commonly through consumption of unpasteurized milk products or by exposure to infected ticks. These infections may initially result in only mild and self-limiting influenza-like illnesses, but if untreated, infections may become chronic, particularly in persons with preexisting heart valve abnormalities or with prosthetic valves. Such persons can develop chronic and potentially fatal endocarditis.

## **Cat-Scratch Disease and Oroya Fever**

Cat-scratch disease is contracted through scratches and bites from domestic cats, particularly kittens, infected with *Bartonella henselae*, and possibly from their fleas (3,4). Exposure can therefore occur wherever cats are found. Oroya fever is transmitted by sandflies infected with *B. bacilliformis*, which is endemic in the Andean highlands.

## **Symptoms**

Clinical presentations of rickettsial illnesses vary (Table above), but common early symptoms, including fever, headache, and malaise, are generally nonspecific. Illnesses resulting from infection with rickettsial agents may go unrecognized or are attributed to other causes. Atypical presentations are common and may be expected with poorly characterized non-indigenous agents, so appropriate samples for examination by specialized reference laboratories should be obtained. A diagnosis of rickettsial diseases is based on two or more of the following: 1) clinical symptoms and an epidemiologic history compatible with a rickettsial disease, 2) the development of specific convalescent-phase antibodies reactive with a given pathogen or antigenic group, 3) a positive polymerase chain reaction test result, 4) specific immunohistologic detection of rickettsial agent, or 5) isolation of a rickettsial agent. Ascertaining the likely place and the nature of potential exposures is particularly helpful for accurate diagnostic testing.

## Prevention

With the exception of the louse-borne diseases described above, for which contact with infectious arthropod feces is the primary mode of transmission (through autoinoculation into a wound, conjunctiva, or inhalation), travelers and health-care providers are generally not at risk for becoming infected via exposure to an ill person. Limiting exposures to vectors or animal reservoirs remains the best means for reducing the risk for disease. Travelers and persons working in areas where organisms may be present should implement prevention based on avoidance of vector-infested habitats, use of repellents and protective clothing, prompt detection and removal of arthropods from clothing and skin, and attention to hygiene.

Q fever and *Bartonella* group diseases may pose a special risk for persons with abnormal or prosthetic heart valves, and *Rickettsia*, *Ehrlichia*, and *Bartonella* for persons who are immunocompromised.

## **ATTACHMENT 2**

### **ENCEPHALITIS ARBOVIRAL ENCEPHALITIDES**



## Encephalitis Arboviral Encephalitides

### Perspectives

Arthropod-borne viruses, i.e., arboviruses, are viruses that are maintained in nature through biological transmission between susceptible vertebrate hosts by blood feeding arthropods (mosquitoes, psychodids, ceratopogonids, and ticks). Vertebrate infection occurs when the infected arthropod takes a blood meal. The term 'arbovirus' has no taxonomic significance. Arboviruses that cause human encephalitis are members of three virus families: the *Togaviridae* (genus *Alphavirus*, *Flaviviridae*, and *Bunyaviridae*).

All arboviral encephalitides are zoonotic, being maintained in complex life cycles involving a nonhuman primary vertebrate host and a primary arthropod vector. These cycles usually remain undetected until humans encroach on a natural focus, or the virus escapes this focus via a secondary vector or vertebrate host as the result of some ecologic change. Humans and domestic animals can develop clinical illness but usually are "dead-end" hosts because they do not produce significant viremia, and do not contribute to the transmission cycle. Many arboviruses that cause encephalitis have a variety of different vertebrate hosts and some are transmitted by more than one vector. Maintenance of the viruses in nature may be facilitated by vertical transmission (e.g., the virus is transmitted from the female through the eggs to the offspring).

Arboviral encephalitides have a global distribution, but there are four main virus agents of encephalitis in the United States: eastern equine encephalitis (EEE), western equine encephalitis (WEE), St. Louis encephalitis (SLE) and La Crosse (LAC) encephalitis, all of which are transmitted by mosquitoes. Another virus, Powassan, is a minor cause of encephalitis in the northern United States, and is transmitted by ticks. A new Powassan-like virus has recently been isolated from deer ticks. Its relatedness to Powassan virus and its ability to cause disease has not been well documented. Most cases of arboviral encephalitis occur from June through September, when arthropods are most active. In milder (i.e., warmer) parts of the country, where arthropods are active late into the year, cases can occur into the winter months.

The majority of human infections are asymptomatic or may result in a nonspecific flu-like syndrome. Onset may be insidious or sudden with fever, headache, myalgias, malaise and occasionally prostration. Infection may, however, lead to encephalitis, with a fatal outcome or permanent neurologic sequelae. Fortunately, only a small proportion of infected persons progress to frank encephalitis.

Experimental studies have shown that invasion of the central nervous system (CNS), generally follows initial virus replication in various peripheral sites and a period of viremia. Viral transfer from the blood to the CNS through the olfactory tract has been suggested. Because the arboviral encephalitides are viral diseases, antibiotics are not effective for treatment and no effective antiviral drugs have yet been discovered.

## Prevention

Arboviral encephalitis can be prevented in two major ways: personal protective measures and public health measures to reduce the population of infected mosquitoes. Personal measures include reducing time outdoors particularly in early evening hours, wearing long pants and long sleeved shirts and applying mosquito repellent to exposed skin areas. Public health measures often require spraying of insecticides to kill juvenile (larvae) and adult mosquitoes.

Selection of mosquito control methods depends on what needs to be achieved; but, in most emergency situations, the preferred method to achieve maximum results over a wide area is aerial spraying. In many states aerial spraying may be available in certain locations as a means to control nuisance mosquitoes. Such resources can be redirected to areas of virus activity. When aerial spraying is not routinely used, such services are usually contracted for a given time period. Financing of aerial spraying costs during large outbreaks is usually provided by state emergency contingency funds. Federal funding of emergency spraying is rare and almost always requires a federal disaster declaration. Such disaster declarations usually occur when the vector-borne disease has the potential to infect large numbers of people, when a large population is at risk and when the area requiring treatment is extensive. Special large planes maintained by the United States Air Force can be called upon to deliver the insecticide(s) chosen for such emergencies. Federal disaster declarations have relied heavily on risk assessment by the CDC.

There are no commercially available human vaccines for these U.S. diseases. There is a Japanese encephalitis vaccine available in the U.S. A tick-borne encephalitis vaccine is available in Europe. An equine vaccine is available for EEE, WEE and Venezuelan equine encephalitis (VEE).

## La Crosse Encephalitis

La Crosse (LAC) encephalitis was discovered in La Crosse, Wisconsin in 1963. Since then, the virus has been identified in several Midwestern and Mid-Atlantic states. During an average year, about 75 cases of LAC encephalitis are reported to the CDC. Most cases of LAC encephalitis occur in children under 16 years of age. LAC virus is a Bunyavirus and is a zoonotic pathogen cycled between the daytime-biting treehole mosquito, *Aedes triseriatus*, and vertebrate amplifier hosts (chipmunks, tree squirrels) in deciduous forest habitats. The virus is maintained over the winter by transovarial transmission in mosquito eggs. If the female mosquito is infected, she may lay eggs that carry the virus, and the adults coming from those eggs may be able to transmit the virus to chipmunks and to humans.

Historically, most cases of LAC encephalitis occur in the upper Midwestern states (Minnesota, Wisconsin, Iowa, Illinois, Indiana, and Ohio). Recently, more cases are being reported from states in the mid-Atlantic (West Virginia, Virginia and North Carolina) and southeastern (Alabama and Mississippi) regions of the country. It has long been suspected that LAC encephalitis has a broader distribution and a higher incidence in the eastern United States, but is under-reported because the etiologic agent is often not specifically identified.

LAC encephalitis initially presents as a nonspecific summertime illness with fever, headache, nausea, vomiting and lethargy. Severe disease occurs most commonly in children under the age of 16 and is characterized by seizures, coma, paralysis, and a variety of neurological sequelae after recovery. Death from LAC encephalitis occurs in less than 1% of clinical cases. In many clinical settings, pediatric cases presenting with CNS involvement are routinely screened for herpes or enteroviral etiologies. Since there is no specific treatment for LAC encephalitis, physicians often do not request the tests required to specifically identify LAC virus, and the cases are reported as aseptic meningitis or viral encephalitis of unknown etiology. Also found in the United States, Jamestown Canyon and Cache Valley viruses are related to LAC, but rarely cause encephalitis.

### **Eastern Equine Encephalitis**

Eastern equine encephalitis (EEE) is also caused by a virus transmitted to humans and equines by the bite of an infected mosquito. EEE virus is an alphavirus that was first identified in the 1930's and currently occurs in focal locations along the eastern seaboard, the Gulf Coast and some inland Midwestern locations of the United States. While small outbreaks of human disease have occurred in the United States, equine epizootics can be a common occurrence during the summer and fall.

It takes from 4-10 days after the bite of an infected mosquito for an individual to develop symptoms of EEE. These symptoms begin with a sudden onset of fever, general muscle pains, and a headache of increasing severity. Many individuals will progress to more severe symptoms such as seizures and coma. Approximately one-third of all people with clinical encephalitis caused by EEE will die from the disease and of those who recover, many will suffer permanent brain damage with many of those requiring permanent institutional care.

In addition to humans, EEE virus can produce severe disease in: horses, some birds such as pheasants, quail, ostriches and emus, and even puppies. Because horses are outdoors and attract hordes of biting mosquitoes, they are at high risk of contracting EEE when the virus is present in mosquitoes. Human cases are usually preceded by those in horses and exceeded in numbers by horse cases which may be used as a surveillance tool.

EEE virus occurs in natural cycles involving birds and *Culiseta melanura*, in some swampy areas nearly every year during the warm months. Where the virus resides or how it survives in the winter is unknown. It may be introduced by migratory birds in the spring or it may remain dormant in some yet undiscovered part of its life cycle. With the onset of spring, the virus reappears in the birds (native bird species do not seem to be affected by the virus) and mosquitoes of the swamp. In this usual cycle of transmission, virus does not escape from these areas because the mosquito involved prefers to feed upon birds and does not usually bite humans or other mammals.

For reasons not fully understood, the virus may escape from enzootic foci in swamp areas in birds or bridge vectors such as *Coquilletidia perturbans* and *Aedes sollicitans*. These species feed on both birds and mammals and can transmit the virus to humans, horses, and other hosts. Other mosquito species such as *Ae. vexans* and *Culex nigripalpus* can also transmit EEE virus.

When health officials maintain surveillance for EEE virus activity, this movement out of the swamp can be detected, and if the level of activity is sufficiently high, can recommend and undertake measures to reduce the risk to humans.

### **Western Equine Encephalitis**

The alphavirus western equine encephalitis (WEE) was first isolated in California in 1930 from the brain of a horse with encephalitis, and remains an important cause of encephalitis in horses and humans in North America, mainly in western parts of the USA and Canada. In the western United States, the enzootic cycle of WEE involves passerine birds, in which the infection is inapparent, and culicine mosquitoes, principally *Cx. tarsalis*, a species that is associated with irrigated agriculture and stream drainages. The virus has also been isolated from a variety of mammal species. Other important mosquito vector species include *Aedes melanimon* in California, *Ae. dorsalis* in Utah and New Mexico and *Ae. campestris* in New Mexico.

Expansion of irrigated agriculture in the North Platte River Valley during the past several decades has created habitats and conditions favorable for increases in populations of granivorous birds such as the house sparrow, *Passer domesticus*, and mosquitoes such as *Cx. tarsalis*, *Aedes dorsalis* and *Aedes melanimon*. All of these species may play a role in WEE virus transmission in irrigated areas. In addition to *Cx. tarsalis*, *Ae. dorsalis* and *Ae. melanimon*, WEE virus also has been isolated occasionally from some other mosquito species present in the area. Two confirmed and several suspect cases of WEE were reported from Wyoming in 1994. In 1995, two strains of WEE virus were isolated from *Culex tarsalis* and neutralizing antibody to WEE virus was demonstrated in sera from pheasants and house sparrows. During 1997, 35 strains of WEE virus were isolated from mosquitoes collected in Scotts Bluff County, Nebraska.

Human WEE cases are usually first seen in June or July. Most WEE infections are asymptomatic or present as mild, nonspecific illness. Patients with clinically apparent illness usually have a sudden onset with fever, headache, nausea, vomiting, anorexia and malaise, followed by altered mental status, weakness and signs of meningeal irritation. Children, especially those under 1 year old, are affected more severely than adults and may be left with permanent sequelae, which is seen in 5 to 30% of young patients. The mortality rate is about 3%.

### **St. Louis Encephalitis**

In the United States, the leading cause of epidemic flaviviral encephalitis is St. Louis encephalitis (SLE) virus. SLE is the most common mosquito-transmitted human pathogen in the U.S. While periodic SLE epidemics have occurred only in the Midwest and southeast, SLE virus is distributed throughout the lower 48 states. Since 1964, there have been 4,437 confirmed cases of SLE with an average of 193 cases per year (range 4 - 1,967). However, less than 1% of SLE viral infections are clinically apparent and the vast majority of infections remain undiagnosed. Illness ranges in severity from a simple febrile headache to meningoencephalitis, with an overall case-fatality ratio of 5-15 %. The disease is generally milder in children than in adults, but in those children who do have disease, there is a high rate of encephalitis. The elderly are at highest risk for severe disease and death. During the summer season, SLE virus is maintained in a mosquito-bird-mosquito cycle, with periodic amplification by peridomestic birds and *Culex*

mosquitoes. In Florida, the principal vector is *Cx. nigripalpus*, in the Midwest, *Cx. pipiens pipiens* and *Cx. p. quinquefasciatus* and in the western United States, *Cx. tarsalis* and members of the *Cx. pipiens* complex.

### **Powassan Encephalitis**

Powassan (POW) virus is a flavivirus and currently the only well documented tick-borne transmitted arbovirus occurring in the United States and Canada. Recently a Powassan-like virus was isolated from the deer tick, *Ixodes scapularis*. Its relationship to POW and its ability to cause human disease has not been fully elucidated. POW's range in the United States is primarily in the upper tier States. In addition to isolations from man, the virus has been recovered from ticks (*Ixodes marxi*, *I. cookei* and *Dermacentor andersoni*) and from the tissues of a skunk (*Spilogale putorius*). It is a rare cause of acute viral encephalitis. POW virus was first isolated from the brain of a 5-year-old child who died in Ontario in 1958. Patients who recover may have residual neurological problems.

### **Venezuelan Equine Encephalitis**

Like EEE and WEE viruses, Venezuelan equine encephalitis (VEE) is an alphavirus and causes encephalitis in horses and humans and is an important veterinary and public health problem in Central and South America. Occasionally, large regional epizootics and epidemics can occur resulting in thousands of equine and human infections. Epizootic strains of VEE virus can infect and be transmitted by a large number of mosquito species. The natural reservoir host for the epizootic strains is not known. A large epizootic that began in South America in 1969 reached Texas in 1971. It was estimated that over 200,000 horses died in that outbreak, which was controlled by a massive equine vaccination program using an experimental live attenuated VEE vaccine. There were several thousand human infections. A more recent VEE epidemic occurred in the fall of 1995 in Venezuela and Colombia with an estimated 90,000 human infections. Infection of man with VEE virus is less severe than with EEE and WEE viruses, and fatalities are rare. Adults usually develop only an influenza-like illness, and overt encephalitis is usually confined to children. Effective VEE virus vaccines are available for equines.

Enzootic strains of VEE virus have a wide geographic distribution in the Americas. These viruses are maintained in cycles involving forest dwelling rodents and mosquito vectors, mainly *Culex (Melanoconion)* species. Occasional cases or small outbreaks of human disease are associated with these viruses, the most recent outbreaks were in Venezuela in 1992, Peru in 1994 and Mexico in 1995-96.

## **Other Arboviral Encephalitides**

Many other arboviral encephalitides occur throughout the world. Most of these diseases are problems only for those individuals traveling to countries where the viruses are endemic.

### **Japanese Encephalitis**

Japanese encephalitis (JE) virus is a flavivirus, related to SLE, and is widespread throughout Asia. Worldwide, it is the most important cause of arboviral encephalitis with over 45,000 cases reported annually. In recent years, JE virus has expanded its geographic distribution with outbreaks in the Pacific. Epidemics occur in late summer in temperate regions, but the infection is enzootic and occurs throughout the year in many tropical areas of Asia. The virus is maintained in a cycle involving culicine mosquitoes and waterbirds. The virus is transmitted to man by *Culex* mosquitoes, primarily *Cx. tritaeniorhynchus*, which breed in rice fields. Pigs are the main amplifying hosts of JE virus in peridomestic environments.

The incubation period of JE is 5 to 14 days. Onset of symptoms is usually sudden, with fever, headache and vomiting. The illness resolves in 5 to 7 days if there is no CNS involvement. The mortality in most outbreaks is less than 10%, but is higher in children and can exceed 30%. Neurologic sequelae in patients who recover are reported in up to 30% of cases. A formalin-inactivated vaccine prepared in mice is used widely in Japan, China, India, Korea, Taiwan and Thailand. This vaccine is currently available for human use in the United States, for individuals who might be traveling to endemic countries.

### **Tick-Borne Encephalitis**

Tick-borne encephalitis (TBE) is caused by two closely related flaviviruses which are distinct biologically. The eastern subtype causes Russian spring-summer encephalitis (RSSE) and is transmitted by *Ixodes persulcatus*, whereas the western subtype is transmitted by *Ixodes ricinus* and causes Central European encephalitis (CEE). The name CEE is somewhat misleading, since the condition can occur throughout much of Europe. Of the two subtypes, RSSE is the more severe infection, having a mortality of up to 25% in some outbreaks, whereas mortality in CEE seldom exceeds 5%.

The incubation period is 7 to 14 days. Infection usually presents as a mild, influenza-type illness or as benign, aseptic meningitis, but may result in fatal meningoencephalitis. Fever is often biphasic, and there may be severe headache and neck rigidity, with transient paralysis of the limbs, shoulders or less commonly the respiratory musculature. A few patients are left with residual paralysis. Although the great majority of TBE infections follow exposure to ticks, infection has occurred through the ingestion of infected cows' or goats' milk. An inactivated TBE vaccine is currently available in Europe and Russia.

### **West Nile Encephalitis**

Discussed elsewhere in this document

## FLD 43 D HAZARDOUS PLANTS

A number of hazardous plants may be encountered during field operations. The ailments associated with these plants range from mild hay fever to contact dermatitis. Plants that present the greatest risk to site workers are those that produce allergic reactions and tissue injury.

### Plants That Cause Skin and Tissue Injury

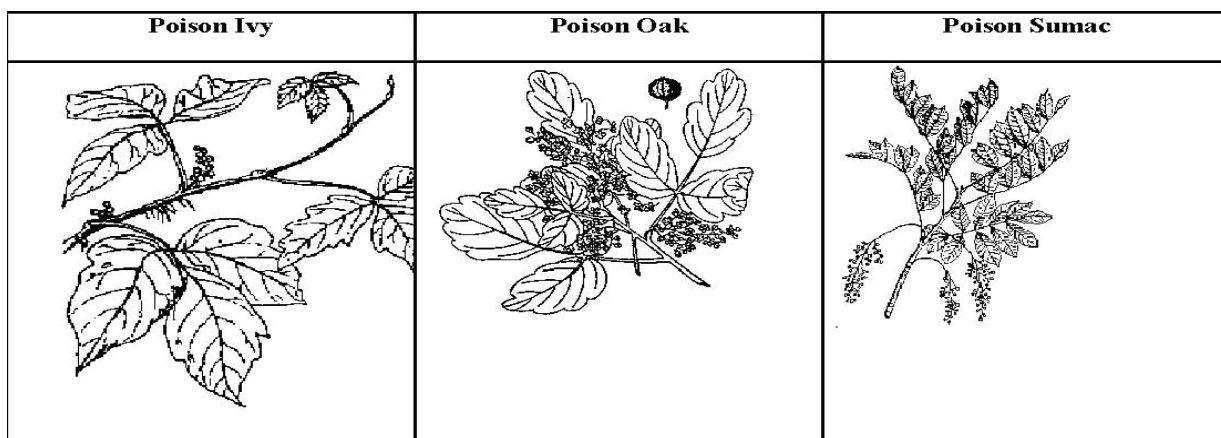
Contact with sharp leaves and thorns are of special concern to site personnel. This concern stems from the fact that punctures, cuts, and even minor scrapes caused by accidental contact may result in skin lesions and the introduction of fungi or bacteria through the skin. This is especially important in light of the fact that the warm moist environment created inside protective clothing is ideal for the propagation of fungal and bacterial infection. Personnel receiving any of the injuries listed above, even minor scrapes shall report immediately for continued observation and care. Keeping the skin covered as much as possible (i.e., long pants and long sleeved shirts) in areas where these plants are known to exist will limit much of the potential exposure.

### Plants That Cause an Allergic Reaction

The poisonous plants of greatest concern are poison ivy, poison oak, and poison sumac. Contact with the poisonous sap of these plants produces a severe rash characterized by redness, blisters, swelling, and intense burning and itching. The victim also may develop a high fever and may be very ill. Ordinarily, the rash begins within a few hours after exposure, but it may be delayed for 24 to 48 hours.

The most distinctive features of poison ivy and poison oak are their leaves, which are composed of three leaflets each. In certain seasons, both plants also have greenish-white flowers and berries that grow in clusters. Poison sumac is a tall shrub or small tree with 6 to 12 leaflets arranged in pairs with a single leaflet at the end. This plant grows in wooded, swampy areas.

**Poison Ivy/Poison Oak/Poison Sumac**



The reaction associated with exposure to these plants will generally cause the following signs and symptoms:

- Blistering at the site of contact, usually occurring within 12 to 48 hours after contact
- Reddening, swelling, itching and burning at the site of contact
- Pain, if the reaction is severe
- Conjunctivitis, asthma, and other allergic reactions if the person is extremely sensitive to the poisonous plant toxin

If the rash is scratched, secondary infections can occur. Preventive measures that are effective for most site personnel include:

- Avoid contact with any poisonous plants on site, and keep a steady watch to identify, report and mark poisonous plants found on site
- Wash hands, face or other exposed areas at the beginning of each break period and at the end of each workday
- Avoid contact with, and wash on a daily basis, contaminated tools, equipment and clothing
- Barrier creams, detoxification/wash solutions and orally administered desensitization may prove effective and should be tried to find the best preventive solution

Keeping the skin covered as much as possible (i.e., long pants and long sleeved shirts) in areas where these plants are known to exist will limit much of the potential exposure.

### **Plants That are Poisonous**

There are a number of plants worldwide beside poison ivy, oak and sumac which have poisonous properties. In many cases consumption of these plants or parts of these plants can result in poisoning. In other cases, contact with the plants may be poisonous. The following is a listing with pertinent information on poisonous properties and locations of a number of plants.

In general, when working in the outdoors or where you may come in contact with household plants or where your families may come in contact with these plants, it is important that as soon as possible after contact the area or areas should be thoroughly washed and hands must be thoroughly washed before eating drinking, smoking or any other hand to mouth contact. C

In keeping with our 24/7 BBS concept, it is important to remember that children are particularly vulnerable to many of the poisonous parts of these plants. Many of these poisonous parts resemble non-poisonous food items such as berries and are attractive.

As with most lists there is extensive information but the list may not include all poisonous plants.

It is important to remember that this document is a starting point to be supplemented with local information. The majority of this information is from a list found in Wikipedia an on line Dictionary readily accessible via Google. The website has pictures of these plants as well as links to other information sources.



# POISONOUS PLANTS

From Wikipedia,

This is a list of plants containing poisonous parts that pose a serious risk of illness, injury, or death to humans.

## Poisonous Food Plants

- Apple (*Malus domestica*) **Found worldwide in cooler climates.** Seeds contain cyanogenic glycosides; although the amount found in most apples won't kill a person.
- Cherry (*Prunus cerasus*), as well as other species (*Prunus spp*) such as peach (*Prunus persica*), plum (*Prunus domestica*), almond (*Prunus dulcis*) and apricot (*Prunus armeninaca*). **There are around 430 species of *Prunus*, spread throughout the northern temperate regions of the globe.** Leaves and seeds contain cyanogenic glycosides
- Potato (*Solanum tuberosum*) **Potatoes originated in the area of modern day Peru and then spread from South America to Spain and from there to the rest of the world after European colonization in the late 1400s and early 1500s.** Foliage and green-tinged tubers are toxic, containing the glycoalkaloid solanine, which develops as a result of exposure to light. Causes intense digestive disturbances, nervous symptoms.
- Rhubarb (*Rheum rhaponticum*) **Found worldwide.** Leaves, but not stems, contain oxalic acid salts, causing kidney disorders, convulsions, coma. Rarely fatal.
- Tomato (*Solanum lycopersicum*) **Found worldwide.** Foliage and vines contain alkaloid poisons which cause digestive upset and nervous excitement.

## Other Poisonous Plants

- Aconite (wolfsbane, monkshood) (*Aconitum napellus*) **Chiefly natives of the mountainous parts of the northern hemisphere, growing in moisture retentive but well draining soils on mountain meadows.** The poison is concentrated in the unripe seed pods and roots, but all parts are poisonous. Causes digestive upset, nervous excitement. The juice in plant parts is **often fatal.**
- Autumn crocus. **Europe, North America and Middle East.** The bulbs are poisonous and cause nausea, vomiting, diarrhea. **Can be fatal.**
- Azalea **Found Worldwide.** All parts of the plant are poisonous and cause nausea, vomiting, depression, breathing difficulties, coma. Rarely fatal.
- Bittersweet nightshade **It is native to Europe and Asia, and widely naturalised elsewhere, including North America.** All parts are poisonous, containing solanine and causing fatigue, paralysis, convulsions and diarrhea. Rarely fatal.

- Bleeding heart / Dutchman's breeches. **North America.** Leaves and roots are poisonous and cause convulsions and other nervous symptoms.
- Black locust. **Southeastern United States, also widely planted and naturalized elsewhere in temperate North America, Europe and Asia.** Pods are toxic
- Black nightshade (*Solanum nigrum*) **Native to Eurasia and also introduced in the Americas. In Hawaii it is called popolo.** All parts of the plant except the *ripe* fruit contain the toxic glycoalkaloid solanine
- Angel's Trumpet (*Brugmansia*). **Native to subtropical regions of South America, along the Andes from Colombia to northern Chile, and also in southeastern Brazil.** All parts of the plant contains the tropane alkaloids scopolamine and atropine. Often fatal.
- Caladium / Elephant ear. **Indigenous to Brazil and to neighboring areas of South America and Central America Cultivated as ornamental plants in temperate North America.** All parts of the plant are poisonous. Symptoms are generally irritation, pain, and swelling of tissues. If the mouth or tongue swell, breathing may be fatally blocked.
- Castor Oil Plant (*Ricinus communis*) Castor Oil Plant. **Indigenous to the southeastern Mediterranean region and Eastern Africa, today it is widespread throughout tropical regions and is found Worldwide.** The phytotoxin is **ricin**, an extremely toxic water soluble protein, which is concentrated in the seed. Also present are ricinine, an alkaloid, and an irritant oil. Causes burning in mouth and throat, convulsions, and is **often fatal.**
- Daffodil. **Native to Europe, North Africa, and Asia, found worldwide.** The bulbs are poisonous and cause nausea, vomiting, and diarrhea. **Can be fatal.**
- Daphne (*Daphne sp.*) **Native to Asia, Europe, and north Africa, also found as ornamental plant worldwide.** The berries (either red or yellow) are poisonous, causing burns to mouth and digestive tract, followed by coma. **Often fatal.**
- Darnel/Poison Ryegrass (*Lolium temulentum*) **Usually grows in the same production zones as wheat and is considered a weed.** The seeds and seed heads of this common garden weed may contain the alkaloids temuline and loliine. Some experts also point to the fungus ergot or fungi of the genus endoconidium both of which grow on the seed heads of rye grasses as an additional source of toxicity.
- Datura nightshade. **Found in temperate and tropical regions of the globe, but is most likely restricted to the Americas, from the United States south through Mexico (where the highest species diversity occurs) to the mid-latitudes of South America. Found in China, It also grows naturally throughout India and most of Australia..** Contains the alkaloids scopolamine and atropine. Datura has been used as a hallucinogenic drug, eg by the native peoples of the Americas.

- Deadly nightshade (*Atropa belladonna*) **Native to Europe, North Africa, and Western Asia, and has become naturalized in parts of North America.** All parts of the plant contain the toxic alkaloid atropine. The young plants and seeds are especially poisonous, causing nausea, muscle twitches, paralysis; **often fatal.**
- Deathcamas / black snakeroot/Star Lily **Found in North America and Asia.** All parts of the plant are poisonous, causing nausea, severe upset.
- Delphinium/Larkspur Contains the alkaloid Delsoline. **Native throughout the Northern Hemisphere and also on the high mountains of tropical Africa.** Young plants and seeds are poisonous, causing nausea, muscle twitches, paralysis, **often fatal.**
- Doll's eyes/White Baneberry). **Native to eastern North America.** Berries are highly poisonous, as well as all other parts.
- Dumbcane / dieffenbachia. **Found in tropical areas and popular as house plants.** All parts are poisonous, causing intense burning, irritation, and immobility of the tongue, mouth, and throat. Swelling can be severe enough to block breathing leading to death.
- Elderberry **Native to temperate to subtropical regions of both the Northern Hemisphere and the Southern Hemisphere;** the genus is more widespread in the Northern Hemisphere, with Southern Hemisphere occurrence restricted to parts of Australasia and South America. The roots are poisonous and cause nausea and digestive upset.
- European Holly (*Ilex aquifolium*) **Native to western and southern Europe, northwest Africa and southwest Asia widely planted in New Zealand, the cooler areas of Australia, and North America.** The berries are poisonous, causing gastroenteritis.
- Foxglove (*Digitalis purpurea*). **Native to Europe, western and central Asia, and northwestern Africa (widely grown as an ornamental plant.** The leaves, seeds, and flowers are poisonous, containing cardiac or other steroid glycosides. These cause irregular heartbeat, and generally digestive upset and confusion. **Can be fatal.**
- Gifblaar (*Dichapetalum cymosum*) . Found in **South Africa**; this plant contains the metabolic poison fluoroacetic acid and appears to be a hazard primarily to livestock.. Fluoroacetic acid is also found in at least 40 Australian plant species.
- Hemlock (*Conium maculatum*). **Native to Europe and the Mediterranean region (*C. maculatum*), and to southern Africa (*C. chaerophylloides*).** **Poison hemlocks have also been cultivated in much of Asia, North America and Australia.** All parts of the plant contain the relatively simple alkaloid coniine which causes stomach pains, vomiting, progressive paralysis of the central nervous system. Can be fatal; it is the poison which killed Socrates.

- Henbane **Originated in Eurasia though it is now globally distributed.** Seeds and foliage poisonous. An anesthetic as well as having psychoactive properties. Toxic effects of henbane use in humans include hallucinations, dilated pupils, restlessness, and flushed skin and potentially tachycardia, convulsions, vomiting, hypertension, hyperpyrexia and ataxia
- Horse-chestnut. **Native to a small area in the mountains of the Balkans in southeast Europe, in small areas in northern Greece, Albania, the Republic of Macedonia, Serbia, and Bulgaria. It is widely cultivated throughout the temperate world.** All parts of the plant are poisonous, causing nausea, muscle twitches, and sometimes, paralysis.
- Hyacinth. **Native to southwestern Asia, in southern and central Turkey, northwestern Syria and Lebanon. It is widely cultivated throughout world.** The bulbs are poisonous, causing nausea, vomiting, gasping, convulsions, and **possibly death.**
- Ivy. Native to the Atlantic Islands, western, central and southern Europe, northwestern Africa, across central-southern Asia east to Japan and parts of North America where winters are not severe. The leaves and berries are poisonous, causing stomach pains, labored breathing, possible coma.
- Jequirity **Tropical areas of in Africa, in Asia and in the Americas.** The seed is highly poisonous. Toxicity is similar to that of ricin, however, more toxic and deadly. Berries are used for beads. A puncture with an object contaminated with the toxin can be deadly.
- Jerusalem cherry **USA, NC, South America** All parts, especially the berries, are poisonous, causing nausea and vomiting. **Looks like a cherry tomato.** It is occasionally fatal, especially to children.
- Jimson weed / datura / thorn apple / stinkweed / /gypsum weeds/Jamestown weed (*Datura stramonium*) **It is found throughout much of the United States, most commonly in the South except for Texas. Datura stramonium is also found throughout many other parts of the world.** All parts of the plant are poisonous, causing abnormal thirst, vision distortions, delirium, incoherence, coma. Often fatal.
- Laburnum **native to the mountains of southern Europe from France to the Balkan Peninsula. Cultivated worldwide as an ornamental.** Some botanists include a third species, *Laburnum caramanicum*, but this native of southeast Europe and Asia Minor is usually treated in a distinct genus *Podocytisus*, more closely allied to the brooms. All parts, especially the seeds, are poisonous, causing excitement, staggering, convulsions, coma, occasionally fatal.
- Larkspur (both *Delphinium* and *Consolida*). **Native throughout the Northern Hemisphere and also on the high mountains of tropical Africa.** Young plants and seeds are poisonous, causing nausea, muscle twitches, paralysis. Often fatal.
- Lilies **Worldwide** There are some 3500 species that comprise the lily (Lilaceae) family. Some are beneficial including (foods such as onion, shallot, garlic, chives [all *Allium* spp] and asparagus) and some with medicinal uses (colchicine and red squill) Many produce alkaloids which are poisonous, especially to cats.

- **Manchineel (*Hippomane mancinella*) Native to the Caribbean (including Florida, Puerto Rico and the Virgin Islands) also found in Central America, South America and Western Africa.** It is one of the most poisonous trees in the world All parts of this tree including the fruit contain toxic phorbol esters typical of the Euphorbiaceae. Sap may cause burning of the skin and smoke from burning may cause eye irritation and blindness. Fruits, which are similar in appearance to an apple, are green or greenish-yellow when ripe.
- **Mayapple (*Podophyllum peltatum*) Native to the eastern part of North America.** Green portions of the plant, unripe fruit, and especially the rhizome contain the non-alkaloid toxin podophyllotoxin which causes diarrhea, severe digestive upset.
- **Monkshood.** See Aconite above.
- **Moonseed.** Native to North America, East Asia, and Mexico. The fruits and seeds are poisonous, causing nausea and vomiting. **Often fatal.**
- **Oleander (*Nerium oleander*) Native to a broad area from Morocco and Portugal eastward through the Mediterranean region and southern Asia to Yunnan in southern parts of China. Cultivated worldwide as an ornamental.** All parts are toxic, containing nerioside, oleandroside, saponins, cardiac glycosides, but especially the leaves and woody stems. They cause severe digestive upset, heart trouble, contact dermatitis. **Often fatal.**
- **Oak Worldwide** Most species foliage and acorns are mildly poisonous, causing digestive upset, heart trouble, contact dermatitis. Rarely fatal.
- **Poison-ivy (*Toxicodendron radicans*), Poison-oak (*T. diversilobum*), and Poison Sumac (*T. vernix*) North America** All parts of these plants contain a highly irritating oil with urushiol (this is actually not a poison but an allergen). Skin reactions can include blisters and rashes. It spreads readily to clothes and back again, and has a very long life. Infections can follow scratching.
- **Pokeweed (*Phytolacca sp.*) Native to North America, South America, East Asia and New Zealand.** Leaves, berries and roots contain phytolaccatoxin and phytolaccigenin - toxin in young leaves is reduced with each boiling and draining.
- **Privet (*Ligustrum sp.*) Native to Europe, north Africa, Asia and Australasia, with the centre of diversity in China, the Himalaya, Japan and Taiwan. Cultivated worldwide.** Berries and leaves are poisonous. Berries contain ligustrin and syringin, which causes digestive disturbances, nervous symptoms. **Can be fatal.**
- **Water hemlock/Cowbane) Native to temperate regions of the Northern Hemisphere mainly North America.** All parts extremely poisonous.

- White snakeroot. **Native to eastern North America.** All parts are poisonous, causing nausea and vomiting. **Often fatal.**
- Yellow Jessamine/Yellow Jasmine. **Native plant in the southeastern United States as far west as Texas, tropical America from Guatemala north.** All parts are poisonous, causing nausea and vomiting. Often fatal. It's possible to become ill from ingesting honey made from jessamine nectar.
- Yew (*Taxus baccata*). **Native to western, central and southern Europe, northwest Africa, northern Iran and southwest Asia. Used Worldwide as an ornamental.** All parts of the plant, except for the fleshy red bit of the fruit, contain taxane alkaloids. The seeds are especially poisonous and are quickly fatal when ingested.

## **FLD 44 BLOODBORNE PATHOGENS EXPOSURE CONTROL PLAN - FIRST AID PROVIDERS**

### **RELATED FLDs**

*FLD 43 – Biological Hazards*

*FLD 45 – Bloodborne Pathogens Exposure Control Plan – Work with Infectious Waste*

### **INTRODUCTION**

Bloodborne pathogens are pathogenic microorganisms which may be present in human blood and can cause disease in humans. These pathogens include, but are not limited to hepatitis B virus (HBV) and human immunodeficiency virus (HIV). The Occupational Safety and Health Administration (OSHA) requires compliance with 29 CFR 1910.1030, Occupational Exposure to Bloodborne Pathogens Standard where, as a condition of employment, there is known or potential exposure to bloodborne pathogens. A source of occupational exposure may occur when an employee gives First Aid and CPR to an individual who has infectious blood and the potentially infectious materials come in contact with the employee's eyes, mucous membranes, non-intact skin through cuts and abrasions.

Additional sources of exposure are contact with infectious waste found at hazardous waste sites; glassware, needles, and other sharp objects which have been involved in injuries to personnel resulting in contamination with blood or related bodily fluids; and laboratory personnel who may analyze samples containing infectious waste. FLD 45 provides a separate Bloodborne Pathogens Exposure Control Plan for Work with Infectious Waste.

In July 1992, OSHA issued a final Standard for Protection of Workers Potentially Exposed to Bloodborne Pathogens (29 CFR 1910.1030). This standard primarily involves medical and research personnel and their exposure to blood or blood-containing fluids infected with Bloodborne Pathogens. The HIV and HBV pathogens could potentially be present in viable states at emergency response sites and infectious or hazardous waste sites, with hepatitis virus being the more likely to survive in temperatures outside the body temperature ranges. Another potential for exposure would be from workers who could be infected. The OSHA Standard specifically includes first aid providers among workers covered by this standard.

WESTON's Corporate Environmental, Health, and Safety (CE&HS) Director is responsible for managing this Exposure Control Plan (ECP). WESTON's Division Environmental, Health, and Safety Managers (DEHSMs) will provide technical guidance and assistance in review and implementation.

This ECP is available on the WESTON EHS Portal site.

### **SCOPE**

WESTON personnel do not provide medical assistance as a primary job duty, however, this Bloodborne Pathogen ECP is applicable to designated first aid providers. Weston workers expected to administer first aid must have a basic understanding of bloodborne pathogens in order to protect themselves effectively from any hazards. At a minimum, this Bloodborne Pathogen ECP for First Aid Providers will be on site and implemented for each project.

WESTON personnel may deliver First Aid and CPR in a nonclinical setting. First Aid and CPR duties are often performed in uncontrolled environments, which, due to a lack of time and other factors, do not allow for application of a complex decision-making process to the emergency at hand.

This ECP is intended to assist personnel in making decisions concerning the use of personal protective equipment (PPE) and resuscitation equipment, as well as for decontamination, labeling, containerizing and disposal procedures.

### **Information Program**

Completion of health and safety plans (HASP) requires identification and assessment of risk from exposure to biological hazards. This ECP deals with forms of infection that are of concern to workers who can come in contact with bodily fluids associated with blood.

WESTON training programs will provide information on bloodborne pathogens and the Occupational Exposure to Bloodborne Pathogens Standard to all field personnel with special emphasis on those employees who may be certified and called upon to perform First Aid.

### **Exposure Control**

This ECP is designed to eliminate or minimize employee exposure to bloodborne pathogens through information and training, use of PPE, safe handling procedures, decontamination, and proper disposal methods.

#### Exposure Determination

Employees certified in First Aid and CPR may be at risk from bloodborne pathogens when these services are rendered. Attachment 1 identifies tasks in which occupational exposure may occur, potential contact, and required protective measures for First Aid providers.

### **METHODS OF COMPLIANCE**

#### **Universal Precautions**

When treating a victim for an injury, conducting CPR, or handling potentially infectious waste, the use of universal precautions is the recommended approach to infection control. Universal precautions assume all human blood and certain human body fluids are infectious for HIV, HBV and other bloodborne pathogens. Other body substances, including feces, urine, or vomit are not included, unless they contain visible blood. Under circumstances in which differentiation between body fluid types is difficult or impossible, all body fluids shall be considered potentially infectious materials.

#### **Work Practice Controls**

Work practice controls reduce the likelihood of exposure by formalizing the manner in which a task is performed.

- All first aid procedures involving blood or other potentially infectious materials shall be performed in a manner that minimizes splashing, spraying, spattering, and generation of droplets of these substances.
- Mouth suctioning of blood or other infectious materials is prohibited.
- When handling sharps such as needles used for bee stings or diabetes, do not recap, purposely bend, break by hand, remove from disposable syringes, or otherwise manipulate by hand.
- As soon as possible after use, contaminated sharps are to be placed in puncture proof/leak proof containers until they can be disposed.



- Broken glassware which may be contaminated shall not be picked up directly with the hands unless gloves are used to protect the hands against cuts. It is best to use mechanical means, such as a brush and dust pan then place contaminated broken glass in a puncture proof/leak proof container.
- When handling red bag waste, hold the top end of the bag rather than the bottom.
- Containers of potentially infectious waste should be labeled with a biohazard label.
- All PPE should be inspected prior to use. PPE should not be worn if the PPE barrier is compromised.
- Hands and other skin surfaces should be washed immediately and thoroughly if contaminated with blood, other body fluids to which universal precautions apply, or their potentially contaminated articles. Hands should always be washed after gloves are removed even if the gloves appear intact.
- Where hand washing facilities are not readily accessible, an antiseptic hand cleaner along with clean cloth/paper towels or antiseptic towelettes should be used. When antiseptic hand cleaners or towelettes are used hands shall be washed with soap and running water as soon as feasible.

### **Engineering Controls**

Engineering controls isolate or remove the bloodborne pathogen hazard from the workplace.

- Proper containerizing, labeling and disposal of contaminated items are required for all potentially infectious waste.
- Minimizing needle sticks by placing them in a puncture proof container.
- Limiting access or close off areas which contain potentially infectious materials.

### **Administrative Controls**

Administrative controls reduce or eliminate bloodborne pathogen hazards from the workplace by program development (i.e., ECP), auditing to ensure these programs are in place and implemented, and providing information and training.

### **Personal Protective Equipment (PPE)**

PPE is specialized clothing or equipment worn by an employee for protection against a hazard. Attachment 1 provides examples of recommendations for PPE in the nonclinical setting; the list is not intended to be all-inclusive.

First-aid kits will be supplemented with bloodborne pathogen kits or supplies and will be readily accessible at all times. The CEH&S Department maintains a list of the minimum content of bloodborne pathogen PPE kits or supplies. The list is accessible on the EHS Portal Site.

If the chance of being exposed to blood is high, the caregiver should put on protective attire before beginning CPR or First Aid. Protective barriers should be used in accordance with the level of exposure encountered.

Under rare or extraordinary circumstances, a responding employee may decide, based on his or her judgment, that use of PPE would prevent delivery of care or pose an increased hazard to safety of the

employee or co-worker. When this judgment has been made, an investigation of the event will be initiated and documented in order to determine what changes in procedures or protective equipment is needed.

### **Resuscitation Equipment**

No transmission of HBV or HIV infection during mouth to mouth resuscitation has been documented. However, because of the risk of salivary transmission of other infectious diseases and the theoretical risk of HIV and HBV transmission during artificial ventilation of trauma victims, disposable mouth to mouth resuscitation masks (one-way valve type only) should be used. These devices are designed to isolate emergency response personnel from contact with victim's blood and blood-contaminated saliva, respiratory secretions, and vomit. Disposable resuscitation equipment and devices should be disposed of once they have been used.

### **Decontamination and Disposal**

All PPE will be removed prior to leaving a contaminated area and secured properly for decontamination or proper disposal.

Decontamination uses physical or chemical means to remove, inactivate, or destroy bloodborne pathogens on a surface or item to the point where they are no longer capable of transmitting infectious particles and the surface or item is rendered safe for handling, use, or disposal. All spills of blood and blood-contaminated fluids should be promptly cleaned up. The area should be decontaminated with a commercial disinfectant solution or a 1:100 solution of household bleach. Soiled cleaning equipment should be cleaned and decontaminated with the disinfectant solution.

If a victim's clothes become soiled with blood during First Aid or CPR, the soiled material (i.e., clothes, resuscitation equipment or disposable towels) should be placed in a red or orange plastic bag. If possible this bag should accompany the victim to the hospital or ambulance. Where on-site emergency care is given and additional medical treatment is not likely, soiled material should be placed in a red or orange plastic bag and then pick-up should be arranged by a local medical waste disposal company. Containers must be identified prior to transport or pick-up.

Any questions regarding the disposal or management of soiled garments or materials should be directed to CE&HS or the applicable DEHSM.

### **Containerizing**

The potentially contaminated materials and sharps container generated from giving First Aid and CPR will be placed in a red or orange container/bag. When PPE is removed it shall be placed in an appropriate designated area for containerization. If the outside contamination of the primary container occurs, the primary container shall be placed within a second container which prevents leakage during handling processing storage, transport or shipping and is labeled or color coded.

Sharps such as needles used for bee stings or diabetes should be placed in a puncture proof/leak proof color coded or labeled container. If other contents could puncture the primary container, the primary container shall be placed within a secondary container which is puncture resistant. The liquid generated from the decontamination process should be contained in a leak proof container until a local medical waste disposal company can provide information on proper disposal based on local, state and federal regulations.

## **Labeling and Hazard Communication**

Biohazard warning labels required by the Standard [29 CFR 1910.1030(g)(1)(i)(B)] must be attached to containers of regulated wastes or other containers of potentially infectious materials during storage, transport or shipment. Red or orange bags may be substituted for labeling requirements, otherwise, a biohazard label with lettering or symbols should be affixed to the outside of each bag or container generated. Consequently, any container so labeled or any red or orange bagged waste or materials shall be considered to contain either blood or other infectious material.

## **Incident Reporting**

When an employee gives First Aid or CPR, or is potentially exposed to a bloodborne pathogen, a Notification of Incident (NOI) Report must be completed. The report must indicate "Potential Exposure to Bloodborne Pathogens". Additionally, the employee will acknowledge potential exposure to bloodborne pathogen on the Monthly Employee Health and Safety Report.

### Vaccination and Post-Exposure Evaluation and Follow-up

The pre-work Hepatitis B Vaccination for First Aid providers is not required, it will therefore, be offered post-exposure.

Hepatitis B vaccines are effective in preventing hepatitis B following a documented exposure when given within 1 week after HBV exposure. The vaccine may be more effective when combined with HBIG, a preparation of immune globulin with high levels of antibody to HBV (anti-HBs). The U.S. Public Health Service and Center for Disease Control guidelines should be accessed for current information.

Upon suspicion or verification of exposure to blood or infectious materials, Hepatitis vaccine will be made available to the exposed individual(s) at no cost to the employee. The employee will immediately be referred to WESTON's Occupational Medical Consultant (OMC) for counseling and management.

In the event the employee declines the Hepatitis B vaccine the Hepatitis B Vaccine Declination form (Attachment 2) must be completed and filed with CE&HS and the OMC.

Upon learning of exposure to a source or source individual found to be positive for HBV or HIV, WESTON's OMC will provide direction on case management. The OMC, after discussion of the exposure situation with the medical clinic or hospital where the victim was evaluated and treated for injury, will determine whether the exposed employee should be tested for HBV or HIV prior to the status of the source being known (or in the case where the source is unknown).

HBV and HIV testing of the source individual should be done at the local offices' medical clinic or at the hospital where the victim was treated for injury. Local laws may apply for testing source individuals in situations where consent cannot be obtained because the source refuses testing or cannot be identified (i.e., an unconscious patient). If the job location does not allow access to the local offices' medical clinic then a new WESTON OMC will be consulted for guidance. The alternate clinic/hospital must offer pretest counseling, post test counseling and referral for treatment.

Consult with WESTON's OMC to determine if the exposed employee should be given the HBV post-exposure vaccination.

Collection and testing of blood for HBV and HIV serological status shall be performed as soon as feasible on the exposed employee's blood (after consent) where the source is found to be positive for HIV or

HBV. Results of the source individual's testing shall be made available to the exposed employee, and the employee shall be informed by CEHS and/or the OMC of applicable laws and regulations concerning disclosure of the identity and infectious status of the source individual. When the source individual is already known to be infected with HBV or HIV testing of the source individual known HBV or HIV status need not be repeated (Center for Disease Control, 1985).

If the source of the exposure is a needle stick or bloodstained material (i.e., blood stained material contacted an open wound on a field team member) the source should be placed in an appropriate container (i.e., sharps container for needles and red bag for blood tainted material). The container should be given to the WESTON medical clinic for analysis. If the source is found to be HBV or HIV positive, the incident report must be updated to change the status from suspected to confirmed exposure. At this point the NOI Report will be placed in a limited control access portion of incident filing system to maintain confidentiality.

### **Human Immunodeficiency Virus Post Exposure Management**

For any exposure to a source or source individual who has AIDS, who is found to be positive for HIV infection or who refuses testing, the worker should be counseled regarding the risk of infection and evaluated clinically and serologically for evidence for the HIV infection as soon as possible after the exposure. WESTON's OMC will provide direction on the case management.

If the source individual was tested and found to be seronegative, follow-up will be determined by WESTON's OMC.

If the source or source individual cannot be identified, decisions regarding appropriate follow-up should be individualized. Serological testing will be made available to all workers who may be concerned they have been infected with HIV through an occupational exposure. WESTON's OMC will provide direction on the case management.

### **Communication of Hazards to Employees**

#### Training Schedule

WESTON ensures that employees, who are certified to provide First Aid and CPR, are trained in all components of the bloodborne pathogen standard upon assignment and at the annual refresher training. All First Aid providers must be aware of task modifications or procedure changes which might affect occupational exposure.

#### Training Contents

A training sign-up sheet will be completed to include course title, date, attendees' names, signatures, job classifications, instructor's name, and duration of the class. Training content will include the following information:

- Where an accessible copy of the regulatory text and the WESTON's ECP can be found.
- An explanation of WESTON's ECP and the means by which employees can obtain a copy of the written plan.
- A general explanation of the epidemiology and symptoms of bloodborne diseases.
- An explanation of the appropriate methods for recognizing tasks and other activities that may involve exposure to blood and other potentially infectious materials.

- An explanation of the use and limitations of methods that will prevent or reduce exposure including appropriate engineering controls, work practices, and PPE.
- Information on the types, proper use, location, removal, handling, decontamination and disposal of PPE.
- An explanation of the basis for selection of PPE.
- Information on the Hepatitis B vaccine (or any new vaccines), including information on its efficacy, safety, method of administration, the benefits of being vaccinated.
- An explanation of the procedure to follow if an exposure incident occurs, including the method of reporting the incident and the medical follow-up that will be made available.
- Information on the post-exposure evaluation and follow-up that WESTON is required to provide for the employee following an exposure incident.
- An explanation of the signs and labels and/or color coding for disposal of infectious materials.
- An opportunity for interactive questions and answers with the person conducting the training session.

### **Recordkeeping**

When an employee gives First Aid or CPR and in doing so becomes subject to this ECP, he/she will verbally report the incident according to WESTON's Operating Practices and then as soon as possible complete a WESTON NOI Report. As part of a medical record, the circumstances of exposure will be kept confidential. Relevant information includes the activities in which the worker was engaged at the time of exposure, the extent to which appropriate work practices and PPE were used, and a description of the source of exposure (USHHS and NIOSH, 1989). When the source is tested for HIV or HBV, the incident report is updated and placed in a confidential file.

### **Dates**

This Exposure Control Plan was revised effective March 2008.

**ATTACHMENT 1**  
**TASK IDENTIFICATION, POTENTIAL CONTACT, AND PROTECTION**

<b>CPR AND FIRST AID</b>			
<b>EMERGENCY SITUATION</b>	<b>SERVICE</b>	<b>POTENTIAL CONTACT</b>	<b>PPE SUGGESTED</b>
Victim is lying on the ground	Primary survey of victim and opening victims airway	Skin to skin contact	Gloves
Victims breathing has ceased	Rescue breathing	Skin to skin contact Mouth to mouth contact	Gloves Resuscitation mouthpiece
No pulse	CPR	Skin to skin contact	Gloves Resuscitation mouthpiece
Victim is lying on the ground	Secondary survey of victim	Skin to skin contact	Gloves
Choking without stoppage of breathing	Heimlich maneuver	Skin to skin contact	None required if skin is intact Non-intact skin requires gloves
Heart Attack	Comfort victim	Skin to skin contact	Gloves
Bleeding with spurting blood	External control	Skin to skin contact	Gloves Gown or coveralls Apron (option) Mask or face protection Eyewear
Minimal bleeding	External control	Skin to skin contact	Gloves
Compound fractures	External control	Skin to skin contact	Gloves
Burns	External control	Skin to skin contact	Gloves
Poisoning	If induced vomiting is needed	Skin to skin contact	Gloves Eyewear
Diabetic shock	Giving an injection	Sharps from needle could cause direct injection	Gloves Sharps container
Bites and stings	Giving an injection	Sharps from needle could cause direct injection	Gloves Sharps container
Seizures	External control	Eyes and skin contact	Gloves Eyewear

<b>CPR AND FIRST AID</b>			
<b>EMERGENCY SITUATION</b>	<b>SERVICE</b>	<b>POTENTIAL CONTACT</b>	<b>PPE SUGGESTED</b>
Stroke	Provide comfort	None	Gloves
Heat Stress/Cold Stress	External control	Skin to skin contact	Gloves
Victim has fainted	Raise legs for shock	Skin to skin contact	Gloves
Victim falls down in hazardous atmosphere	Rescue victim from area	Skin to skin contact	Gloves
Soiled clothes handling	Place soiled clothing and materials in red/orange bag	Skin contact with bloodborne pathogens in clothing fabrics	Gloves Gown or apron (as needed)
Decontamination	Scrub with disinfectant	Skin contact with bloodborne pathogens in clothing fabrics	Gloves Gown or apron (as needed)
Containerization	Place contaminated clothing into bags	Potential skin contact with residual bloodborne pathogen on bags	Gloves Gown or apron (as needed)

**ATTACHMENT 2**  
**DECLINATION OF VACCINATION**  
**(29 CFR 1910.1030, APPENDIX A)**

I understand that due to my occupational exposure to blood or other potentially infectious materials I may be at risk of acquiring hepatitis B virus (HBV) infection. I have been given the opportunity to be vaccinated with hepatitis B vaccine, at no charge to myself. However, I decline hepatitis B vaccination at this time. I understand that by declining this vaccine, I continue to be at risk of acquiring hepatitis B, a serious disease. If in the future I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with hepatitis B vaccine, I can receive the vaccination series at no charge to me.

\_\_\_\_\_  
Employee Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Employee Name (Print)

\_\_\_\_\_  
Employee Number

\_\_\_\_\_  
Safety Officer Signature

\_\_\_\_\_  
Date

A copy of this form will be maintained in the employees medical file, a copy given to the employee, and the original forwarded to the OMC.



## **FLD 57 – MOTOR VEHICLE SAFETY**

### **RELATED OP AND FLD**

*OP 11-01-017 – Motor Vehicle Safety*

*FLD 11 – Rough Terrain*

This FLD applies to vehicles other than passenger vehicles that are operated when performing WESTON activities/operations. WESTON personnel safe driving requirements must be included in site-specific health and safety plans and accident prevention plans.

### **SAFE VEHICLE OPERATION**

The vehicle operator is responsible for the vehicle, and for ensuring that the vehicle is in good working condition before use. WESTON employees must not operate a vehicle with any mechanical defect which endangers the safety of the driver, passengers, or the public. Before use, the vehicle operator must ensure that the vehicle is safe to operate and free from apparent damage that could result in failure while in use. The vehicle operator documents the inspection of the Equipment/Trucking Inspection Checklist available on the Weston EHS Portal.

Vehicle operators are responsible for observing the procedure established in *OP 11-01-017 Motor Vehicle Safety* and the following requirements:

- comply with all state and local traffic laws
- drive defensively
- comply with client requirements regarding motor vehicle operation
- use seat belts at all times when the vehicle is in motion
- ensure that all passengers are using seat belts at all times when the vehicle is in motion
- use caution when driving through congested areas, or near where personnel and equipment are working
- use a spotter for backing vehicles, if possible.

Vehicle operators must observe the following prohibited actions:

- DO NOT operate a motor vehicle under the influence of alcohol or drugs.
- DO NOT leave keys in an unattended vehicle.
- DO NOT leave the driver's seat of a vehicle while the motor is running.
- DO NOT operate a motor vehicle when abnormally tired.
- DO NOT drive beyond any barricades or into any area posted with designations, such as "NO TRESPASSING," "RESTRICTED AREA," or "DO NOT ENTER."
- DO NOT allow riders on the outside of a vehicle while it is in motion.

## **SAFETY DURING TRAVEL**

- Know the traveling height (overhead clearance), width, length, and weight of the vehicle and know highway and bridge load, width and overhead limits, making sure these limits are not exceeded with an adequate margin.
- Never move a vehicle unless the vehicle brakes are in sound working order.
- Allow for any overhang when cornering or approaching other vehicles or structures.
- Be aware that the canopies of service stations and motels may be too low for a high-profile vehicle.
- Watch for low hanging electrical lines, particularly at the entrances to work sites, restaurants, motels, or other commercial sites.
- Remove all ignition keys when a drill rig is left unattended.
- For off-road travel, refer to FLD 11.

## **LOADING AND UNLOADING**

The following guidelines should be followed, as applicable, when loading and unloading vehicles.

Tractors and/or trailers must be chocked during loading and unloading. Deck plates and positive anchor systems must be used for delivery to elevated platforms at trailer floor level if unloaded by fork lifts. Trailers detached from tractors must have additional support if fork lifts will enter or if instability of load presents a hazard of front wheels collapsing.

When loading or unloading a vehicle (such as a drill rig) or other “large” equipment on a trailer or a truck:

- Use ramps of adequate design that are solid and substantial enough to bear the weight of the vehicle or equipment with carrier - including tooling.
- Load and unload on level ground.
- Use the assistance of someone on the ground as a guide.
- Check the brakes on the vehicle or carrier before approaching loading ramps.
- Distribute the weight of the vehicle or carrier, and tools on the trailer so that the center of weight is approximately on the centerline of the trailer and so that some of the trailer load is transferred to the hitch of the pulling vehicle. Refer to the trailer manufacturer's weight distribution recommendations.

Secure the vehicle/equipment and tools to the hauling vehicle with ties, chains, and/or load binders of adequate capacity.

## **INSPECTION AND PRECAUTIONS**

### **Tires**

Vehicle tires must be checked daily for safety and during extended travel for loss of air, and maintained and/or repaired in a safe manner. If tires are deflated to reduce ground pressure for movement on soft ground, the tires must be reinflated to normal pressures before movement on firm or hilly ground or on streets, roads, and highways. Under-inflated tires are not as stable on firm ground as properly inflated

tires. Air pressures should be maintained for travel on streets, roads, and highways according to the manufacturer's recommendations. During tire checks, inspect for:

- Missing or loose wheel lugs.
- Objects wedged between duals or embedded in the tire casing.
- Damage to or poorly fitting rims or rim flanges.
- Abnormal or uneven wear and cuts, breaks, or tears in the casing.

The repair of truck and off-highway tires should only be made with required special tools and following the recommendations of a tire manufacturer's repair manual.

## **Batteries**

Batteries contain strong acid. Use extreme caution when inspecting or charging batteries.

- Service batteries in a ventilated area while wearing safety glasses.
- When charging a battery with a battery charger, turn off the power source to the battery before either connecting or disconnecting charger loads to the battery posts. Cell caps should be loosened prior to charging to permit the escape of gas.
- Spilled battery acid can burn your skin and damage your eyes. Immediately flush spilled battery acid off of your skin with lots of water. Should battery acid get into someone's eyes, flush immediately with large amounts of water and see a medical physician at once.
- To avoid battery explosions, keep the cells filled with electrolyte, use a flashlight (not an open flame) to check electrolyte levels, and avoid creating sparks around the battery by shorting across a battery terminal. Keep lighted smoking materials and flames away from batteries.
- When a battery is removed from a vehicle or service unit, disconnect the battery ground clamp first.
- Secure batteries when transporting to prevent tip over.
- When installing a battery, connect the battery ground clamp last.

## **Fuel**

Special precautions must be taken for handling fuel and refueling vehicles. Vehicles should not be fueled from open cans or by other makeshift methods, as there is great danger of flash fire from hot engines.

- Engines should be shut off while fueling.
- Only use the type and quality of fuel recommended by the engine manufacturer.
- Refuel in a well-ventilated area.
- Do not fill fuel tanks while the engine is running. Turn off all electrical switches.
- Do not spill fuel on hot surfaces. Clean any spillage before starting an engine.
- Wipe up spilled fuel with cotton rags or cloths - do not use wool or metallic cloth.
- Keep open lights, lighted smoking materials, and flames or sparking equipment well away from the fueling area.
- Turn off heaters in carrier cabs when refueling the carrier.

- Do not fill portable fuel containers completely full to allow expansion of the fuel during temperature changes.
- Keep the fuel nozzle in contact with the tank being filled to prevent static sparks from igniting the fuel.
- Do not transport portable fuel containers in the vehicle or carrier cab with personnel.
- Keep fuel containers and hoses in contact with a metal surface during travel to prevent the buildup of static charge.

## **FLD 58 DRUM HANDLING OPERATIONS**

### **REFERENCES**

29 CFR 1910.120 and 29 CFR 1926.65 – Occupational Safety and Health Administration (OSHA)  
40 CFR Parts 264, 265 and 311 – U.S. Environmental Protection Agency (EPA)  
49 CFR Parts 171 through 178 – U.S. Department of Transportation (DOT)  
USACE EM 385-1-1 – U.S. Army Corps of Engineers

### **RELATED FLDs**

*FLD 08 – Confined Space Entry Program*

*FLD 40 – Storage Tank Removal and Decommissioning*

One of the most hazardous operations to be conducted at any hazardous waste site is the handling of drums and other containers. Container contents cannot be relied upon to be the same as existing markings. Extreme caution is necessary for the safety of site workers, the public and the environment.

Accidents have occurred during the handling of drums and other containers. Hazards associated with drum or other container handling include; fires, explosions, vapor releases, spills and injuries from lifting or other physical hazards associated with moving containers. In order to increase employee safety when container movement or handling is anticipated, strict guidelines that limit the numbers of personnel exposed to drum/container handling hazards are necessary.

This FLD identifies generic safety guidance for those activities involving drum handling at hazardous waste operations. Site-specific criteria must be included in any health and safety plan (HASP) to anticipate potential hazards associated with drum handling task.

Various standards are in effect for the movement and handling of drums and other containers. Site-specific HASPs must anticipate and follow the standards referenced as related to site activities.

### **GENERAL**

Hazardous substances, contaminated liquids, and other residues will be handled, transported, labeled, and disposed of in accordance with this FLD and applicable regulatory standards.

Drums and containers used during remediation activities must meet the appropriate DOT, OSHA, and EPA regulations for the wastes or materials that they contain.

When practical, drums and containers are to be inspected and their integrity ensured prior to being moved. Drums or containers that cannot be inspected before being moved because of storage conditions (e.g., buried beneath the earth, stacked behind other drums, stacked several tiers high in a pile) will be moved to an accessible location and inspected prior to further handling.

Unlabeled drums and containers will be considered to contain hazardous substances and handled accordingly until the contents are positively identified and labeled.

Site operations must be organized to minimize the amount of drum or container movement.

Fire extinguishing equipment will be on hand and ready for use to control incipient fires.

Level B protective equipment must be used as a minimum unless available evidence/research indicates that a lower level of protection is safe or a higher level of protection is necessary.

### **Locating and Inspecting Drums/Containers - Minimal Criteria**

Review background data and site history to determine types and location of containers either known or suspect.

Conduct geophysical surveys utilizing devices such as, ground-penetrating system or other type of detection system or device to estimate the location and depth of buried drums or containers.

Monitor the site utilizing appropriate direct-reading instrumentation to verify the presence of potential volatile materials.

For visible containers, approach containers cautiously and in appropriate levels of protection based upon available evidence. Continue air monitoring with direct-reading instruments following appropriate action levels.

Visually determine container integrity and observe for signs of current or historic leakage.

### **Container Movement and Handling - Minimal Criteria**

Implement a spill containment plan prior to any container movement. This plan must include, at a minimum, provisions for appropriate types and numbers of over-pack containers, absorbent, tools and other emergency equipment determined to be necessary. Personnel must be instructed in procedures to follow in the event of a spill.

Monitor containers utilizing the appropriate direct-reading instruments for each container to verify potential leakage and employee exposure to contents.

Perform excavation activities carefully to avoid the possibility of rupturing any containers. Excavation activities must be in compliance with 29 CFR 1926 Subpart P (Excavations).

Prior to movement of drums or containers, brief all employees exposed to the transfer operation on the potential hazards associated with the contents of the drums or containers.

Empty all drums and containers that cannot be moved without rupture, leaking, or spills. Drums or containers will be emptied into a sound container using a device classified for the material being transferred.

Move and handle containers preferably using a drum grappler. Other means of handling must be justified in the HASP. Movement by hand is to be offered as a last resort.

Overpack damaged containers or those with suspect integrity or transfer contents to appropriate containers prior to movement (if safe to do so). Proper assessment of contents must be made prior to transfer. Proper grounding and bonding techniques must be followed.

Use blast shields on excavation and container handling equipment unless the hazard and risk assessment indicates it is safe to perform the operation without blast shields.

If drums are to be moved utilizing drum slings, yokes, or other accessories, ensure that workers move away from the area after affixing the accessory and prior to drum movement by the equipment operator.

Do not move critically swollen containers by hand. Pressure is to be safely relieved prior to movement unless movement is by grappler and properly protected equipment operator.

Remotely handle containers suspected of containing explosive or reactive materials.

### **Drum Staging, Opening, and Sampling - Minimal Criteria**

Identify staging areas prior to container movement. Based upon the perceived risk from container contents, the staging area must be remote from other site activities.

Ensure that minimal and appropriate equipment (e.g., fire protection, spill control and containment, PPE) is available at the staging area.

Stage compressed gas cylinders in a shaded area.

Remotely handle potentially reactive, explosive, or shock-sensitive containers and stage them separate from other containers.

Stage containers to allow ease in sampling, appropriate aisle space and the avoidance of cross-contamination or reaction during opening activities.

Ensure that employees do not stand upon or work from drums or containers.

Open all drums and containers in such a manner that excess interior pressure will be safely relieved. If pressure cannot be relieved from a remote location, ensure that appropriate shielding is placed between the employee and the drums or containers to reduce the risk of injury.

Ensure that material handling equipment used to transfer drums and containers is selected, positioned and operated to minimize the potential for sources of ignition related to the equipment from igniting vapors released from ruptured drums or containers.

Do not handle drums and containers containing radioactive wastes until appropriate clearance is obtained in writing from the Corporate Radiation Safety Officer, Corporate Health and Safety Director, or designee.

Use only spark-proof tools in drum opening operations.

Perform sampling of containers and drums in accordance with a sampling plan prepared as a part of the site-specific HASP.

As a minimum, take the following special precautions when handling drums and containers containing or suspected of containing shock-sensitive wastes:

- All non essential employees will be evacuated from the area of transfer.
- Material handling equipment will be provided with explosive containment devices or protective shields to protect equipment operators from the potential of exploding containers.

- An employee alarm system capable of being heard or seen above surrounding light and noise conditions will be used to signal the commencement and completion of explosive waste handling activities.
- Continuous communications (i.e., portable radios, hand signals, telephones, as appropriate) will be maintained between the employee in charge of the immediate handling area and both the field safety officer and the command post until such time as the handling operation is completed.
- Communication equipment or methods that could cause shock sensitive materials to explode will not be used.
- Drums and containers under pressure, as evidenced by bulging or swelling, will not be moved until such time as the cause for excess pressure is determined and appropriate containment procedures have been implemented to protect employees from explosive relief of the drum.
- Drums and containers containing packaged laboratory wastes will be considered to contain shock sensitive or explosive materials until they have been characterized.

### **Laboratory Waste Packs (Lab Packs)**

In addition to the requirements outlined for shock sensitive wastes, the following precautions will be taken at a minimum when handling laboratory waste packs (lab packs):

- Lab packs will be opened only when necessary and then only by an individual knowledgeable in the inspection, classification, and segregation of the containers within the pack according to the hazards of the wastes.
- If crystalline material is noted on any container, the contents will be handled as a shock sensitive waste until the contents are identified.
- Remote opening of Lab Pack containers is the preferred technique.
- Manual opening lab packs must be approved in the HASP based upon appropriate hazard analysis.

### **Consolidation and Re-containerization - Minimal Criteria**

Segregate containers based upon on-site compatibility testing.

Promptly clean up any spillage to preclude inadvertent reactions or cross-contamination.

Perform bulking of materials only after appropriate compatibility testing.

Ensure that drums and other repackaging containers meet DOT criteria for the hazard class of the material.

### **Interim Storage and Transportation - Minimal Criteria**

Ensure that Interim Storage areas are in compliance with EPA standards for container storage.

Inspect storage areas weekly, at a minimum. The criteria outlined in 40 CFR Part 265 will be utilized as guidance.

Ensure that adequate aisle space is maintained for worker protection in the storage area.



Ensure that containers are protected (as necessary) from adverse weather conditions. Containers of compressed gasses or reactive or explosive materials should be protected from environmental conditions by covers or shades.

Ensure that fire extinguishers and eye wash stations are available near the storage area.

Ensure that adequate spill control equipment is available near the storage area.

Transport containers according to appropriate USDOT and USEPA regulations.

### **Tank and Vault Procedures**

Tanks and vaults containing hazardous substances must be handled in a manner similar to that for drums and containers, taking into consideration the size of the tank or vault as well as FLD 40.

Appropriate tank or vault entry procedures must be in compliance with FLD 08, Confined Space Entry Program.

## Summary of Safety Precautions for Drum, Cylinder, and Unknown Container Handling

<b>ACTIVITY:</b> Locating Containers and Conducting Inventory	
<b>POTENTIAL SAFETY HAZARD:</b> Unknown location and contents of drums can lead to unsuspected hazards.	
<b>Safety Tips</b>	<ul style="list-style-type: none"> <li>• Carefully review background data pertaining to the location and types of wastes on-site.</li> <li>• Conduct visual to minimize the possibility of puncturing drums. A spotter should be utilized to identify drums during excavation activities.</li> <li>• During the random sampling of containers, which may be required for an inventory, spacing between containers should be adequate to allow for emergency evacuation if needed.</li> <li>• Use remotely operated, non-sparking tools for random sampling whenever possible.</li> <li>• Use direct-reading air monitoring equipment to detect hot spots where contamination may pose a risk to worker safety.</li> </ul>
<b>ACTIVITY:</b> Determining Container Integrity	
<b>POTENTIAL SAFETY HAZARD:</b> The process of visual inspections requires close contact with containers of unknown content.	
<b>Safety Tips</b>	<ul style="list-style-type: none"> <li>• Approach container cautiously. Conduct air monitoring to indicate levels of hazards that require withdrawal from the work area or use of additional safety equipment.</li> <li>• Any container that is critically swollen should not be approached without proper PPE. It should be isolated using a barricade until the pressure can be relieved remotely.</li> <li>• Use of the grappler or other remotely operated equipment can eliminate the need for determining container integrity prior to excavation, provided that rupture of the container will not result in fire or unacceptable environmental impact.</li> </ul>
<b>ACTIVITY:</b> Container Excavation and Handling	
<b>POTENTIAL SAFETY HAZARD:</b> Exposure to toxic/hazardous vapors; rupture of containers.	
<b>Safety Tips</b>	<ul style="list-style-type: none"> <li>• Where buried drums are suspected, conduct a visual survey before using any construction equipment in order to minimize the possibility of rupture. (If practical, a geophysical survey could be used prior to excavation.)</li> <li>• Use a container grappler where possible and cost-effective to minimize contact with containers. If a grappler is not available, pump or over pack drums of poor integrity before excavation.</li> <li>• Ground equipment prior to transferring wastes to new containers.</li> <li>• Use non-sparking hand tools and non-sparking bucket teeth on excavation equipment, and use Plexiglas shields on vehicle cabs.</li> <li>• Where slings, yokes, or other accessories must be used, workers should back away from the work area after attaching the accessory and before the container is lifted.</li> <li>• Critically swollen or bulging drums should not be handled until pressure can be relieved.</li> <li>• Use bars that fit over the teeth of excavation buckets to prevent container puncture.</li> <li>• Where ionizing levels of radiation are detected, the Field Safety Officer and Site Radiological Control Technician should be contacted and the work activity should stop.</li> <li>• Where explosive or shock-sensitive material is suspected, every effort should be made to handle the container remotely. Gas cylinders should not be dragged during handling.</li> <li>• Use direct-reading air monitoring equipment when in close proximity to containers to detect any hot spots.</li> </ul>

<b>ACTIVITY:</b> Container Staging and Opening	
<b>POTENTIAL SAFETY HAZARD:</b> Release of toxic, hazardous vapors, rupture of containers.	
<b>Safety Tips</b>	<ul style="list-style-type: none"> <li>• Stage gas cylinders in a cool, shaded area.</li> <li>• Stage potentially explosive or shock-sensitive wastes in a diked, fenced area.</li> <li>• Use remote container opening methods where containers are determined to be unsound.</li> <li>• Conduct remote-operated container opening form behind a barricade or behind a Plexiglas shield if backhoe-mounted puncture is being used.</li> <li>• Isolate container opening form staging and other activities if possible to prevent a chain reaction if an explosion or reaction does occur.</li> <li>• If container opening cannot be isolated from staging, containers should be staged so as to: (1) minimize the possibility of chain reactions in the event of a fire or explosion; and (2) provide adequate space for emergency evacuation.</li> <li>• Use only non-sparking hand tools if containers are to be opened manually.</li> <li>• Remotely relieve the pressure of critically swollen containers before opening.</li> <li>• Clean up spills promptly to minimize mixing of incompatible materials (Use the SPCCP for guidance.)</li> </ul>
<b>ACTIVITY:</b> Consolidation and Recontainerization	
<b>POTENTIAL SAFETY HAZARD:</b> Mixing of incompatible wastes.	
<b>Safety Tips</b>	<ul style="list-style-type: none"> <li>• Perform on-site compatibility or HAZCAT testing on all containers.</li> <li>• Segregate wastes according to compatibility class following compatibility testing.</li> <li>• Clean up spills promptly to avoid mixing or incompatible wastes.</li> <li>• Intentional mixing of incompatible wastes such as acids and bases should be performed under controlled conditions in a reaction tank where temperature and vapor release can be monitored.</li> <li>• Monitor for incompatible reactions during consolidation using direct-reading air monitoring equipment.</li> </ul>
<b>ACTIVITY:</b> Interim storage and transportation.	
<b>POTENTIAL SAFETY HAZARD:</b> Mixing of incompatible wastes.	
<b>Safety Tips</b>	<ul style="list-style-type: none"> <li>• Segregate incompatible wastes using dikes during interim storage.</li> <li>• Maintain a weekly inspection schedule.</li> <li>• Allow adequate aisle space between containers to allow rapid exit of workers in case of emergency.</li> <li>• Keep explosives and gas cylinders in a cool, shaded, or roofed area.</li> <li>• Prevent contact of water reactive wastes with water.</li> <li>• Clean up spills or leaks promptly.</li> <li>• Have fire fighting equipment readily available within the storage area.</li> <li>• Ensure adherence to DOT regulations regarding transport of incompatible wastes and container integrity.</li> </ul>

## **FLD 59 DECONTAMINATION**

### **REFERENCES**

*Occupational Safety and Health Guidance Manual for Hazardous Wastes Site Activities* - (Occupational Safety and Health Administration [OSHA], National Institute for Occupational Safety and Health [NIOSH], the U.S. Coast Guard, and the U.S. Environmental Protection Agency [EPA])

Site specific decontamination procedures for personnel and equipment are specified in each site-specific health and safety plan (SSHSP). Decontamination procedures are communicated to site workers during site safety and health orientation.

Standard operating procedures have been developed to minimize employee contact with hazardous substances or with equipment that has contacted hazardous substances. The standard procedures are based on the publication, *Occupational Safety and Health Guidance Manual for Hazardous Wastes Site Activities* (Guidance Manual). These procedures include but are not limited to:

- Adhere to the site control plan.
- Limit access to authorized and trained personnel.
- In unknown situations expose only those who need to be exposed for the duration they need to be exposed. In other words plan to use the minimum number of persons to accomplish the work in as little time as possible.
- Work in pairs. Use the buddy system to ensure proper personal protective equipment (PPE) donning, check on PPE integrity during entry, and assist with decontamination following entry.
- Use double layers to protect most likely points of contact (hands and feet). Then limit contact with potential contamination to the double protected areas (soles of feet and hands).
- Where possible, do not step in obvious contamination. Avoid puddles, discoloration or obvious chemical residue.
- Do not touch containers under pressure or leaking containers. Open containers under pressure remotely. Use remote sampling and handling opening techniques (e.g., drum grapplers, pneumatic impact wrenches).
- Seal sensitive handheld equipment, instruments, etc. in bags which can be easily removed while allowing the equipment to function.
- Wear disposable outer garments and use disposable equipment where appropriate.
- Cover equipment and tools with a strippable coating which can be removed during decontamination.
- Encase or cover the source of contaminants, e.g., with plastic sheeting or over-packs.
- Set mobile equipment with long reach attachments in clean areas and limit contact with contaminants to as little of the machine surface as possible.

### **PERSONNEL AND EQUIPMENT DECONTAMINATION**

Only personnel who have completed the requisite training and medical exams/tests may enter the exclusion zone (EZ). Personnel decontamination facilities will be established on-site to ensure that personnel maintain a high degree of personal hygiene and minimize the possibility of exposure to chemical hazards. Personnel hygiene facilities will meet the requirements of 29 CFR 1910.120.

A personnel decontamination line will be established in the contamination reduction zone (CRZ) to facilitate decontamination and protective clothing removal. Storage and disposal containers will be used for the disposal of outerwear. If there is a rip or tear in the employee's chemical protective clothing, that individual will replace the torn garment in the decontamination area and don new protective clothing. If respiratory equipment becomes defective or damaged, the wearer will leave the EZ immediately and repair or replace the defective part or mask.

As personnel move through the decontamination line, PPE will be removed in the order of highest to lowest potential contamination. This outside-in removal minimizes contamination of inner clothing or body. All personnel exiting the EZ will pass through the decontamination line. Respirators will be inspected daily, washed, and scrubbed in a detergent/water solution. Clean respirators will be left to dry in an uncontaminated protected atmosphere.

All PPE and PPE clothing for decontamination line attendants will be removed on the decontamination line. An emergency eyewash will be located in the CRZ adjacent to the decontamination line.

Personnel are required to wash hands, face, and other exposed skin areas prior to leaving the CRZ for breaks or lunch. Towels and soap will be provided for personnel.

The use of tobacco products and eating or drinking will be prohibited except in a designated break area within the support zone (SZ).

### **Routine Equipment Decontamination**

Unless otherwise stipulated in the SSHSP, any equipment or vehicle taken into the EZ must be assumed to be potentially contaminated and will be routinely inspected and decontaminated in the CRZ prior to leaving the site. It will be the responsibility of the Field Safety Officer (FSO) or designee to properly inspect and approve, for general cleanliness, all tools or hand operated equipment, and the frame and tires of all vehicles or heavy equipment leaving the CRZ. In order for vehicles and heavy equipment to pass inspection, they must be free of loose dirt or stabilized material on tailgates, axles, wheels, etc. Approval will be based on visual inspection of all exposed surfaces.

If necessary, WESTON will use an equipment decontamination pad located in the CRZ. This pad will be used to remove soil from all equipment leaving the work area. Decontamination procedures will consist of high-pressure water or steam cleaning of equipment to remove mud and/or dirt.

All equipment requiring maintenance or repair will be staged in the CRZ prior to servicing. Equipment wash water residue will be collected and disposed as either solid or hazardous waste based upon site conditions. Only clean water is to be used for decontamination of personnel, equipment, and vehicles.

Personnel assigned to vehicle decontamination will wear protective equipment, clothing, and respiratory protection consistent with the established health and safety program as defined in the SSHSP. Seats and floors in equipment and vehicles to be used in the EZ will be covered to the extent possible with disposable polyethylene (as necessary).

### **PPE and Decontamination Procedures**

As necessary, the Field Supervisor/Site Manager or FSO will designate personnel to assist the work party in the donning and doffing of PPE as they proceed in and out of the CRZ. Decontamination is accomplished to ensure the materials that personnel and equipment may have contacted in the EZ are removed in the CRZ before passing into the SZ.

## Personnel decontamination

The following procedures are based on the Guidance Manual as standard guidance. The decontamination section of SSHSPs will be based on risk assessments and available information. Personnel decontamination plans may be more or less stringent based on contaminants of concern and potential for contamination.

### Modified Level D

- Any site equipment will be deposited in a segregated area prior to entering the CRZ.
- At the perimeter of the EZ, rain gear or splash protection (if worn) will be damp wiped or wet sprayed to remove any adhered particulates or corrosive liquids.
- Over-boots or over-the-sock boots will be scrubbed with a detergent/water solution. The boots will be removed and placed on a rack to dry.
- Hard hats will be removed and properly stored. Hard hats will be scrubbed with detergent if grossly contaminated.
- Outer gloves will be cleaned and removed, and, depending on condition, will be discarded (if damaged or uncleanable).
- Splash gear will be removed, cleaned, and hung to dry (if worn).
- Tyvek or Saranex suits will be discarded.
- Latex inner gloves will be discarded.
- Personnel will wash their hands, arms, neck, and face.

### Level C/Level B

- Deposit any site-used equipment in a segregated area prior to entering the CRZ.
- At the perimeter of the EZ, rain gear or splash protection (if worn) will be damp wiped or wet sprayed to remove any adhered particulates or corrosive liquids.
- Outer-boot covers or over-the-sock boots will be scrubbed with a detergent/water solution. The boots will be removed and placed on a rack to dry.
- Hard hats will be removed and properly stored. Hard hats will be scrubbed with detergent and rinsed if grossly contaminated.
- Outer gloves will be cleaned and removed, and, depending on condition, will be discarded (if damaged or uncleanable).
- Splash gear will be removed, cleaned, and hung to dry (if worn).
- Tyvek or Saranex suits will be discarded.
- Respirators will be removed and prepared for reuse or decontamination.
- Latex inner gloves will be discarded.
- Personnel will wash their hands, arms, neck, and face.

### Emergency Decontamination

In the event that a site worker in the EZ is injured or appears to exhibit signs of chemical exposure, emergency decontamination will be performed. Supplies for the emergency decontamination will be placed in the CRZ prior to site activities and shall include:

- Eyewash/shower if required
- First aid/Bloodborne pathogen (BBP) kit
- Plastic sheeting or disposable rescue blanket

These materials will be required in addition to the general decontamination equipment required for standard decontamination activities.

All employees leaving a contaminated area will be appropriately decontaminated and all contaminated clothing and equipment leaving a contaminated area will be appropriately disposed of or decontaminated.

Decontamination procedures will be monitored by the FSO to determine their effectiveness. When such procedures are found to be ineffective, appropriate steps shall be taken to correct any deficiencies.

Decontamination shall be performed in geographical areas that will minimize the exposure of uncontaminated employees or equipment to contaminated employees or equipment.

All equipment and solvents used for decontamination will be decontaminated or disposed of properly.

Personal protective clothing and equipment will be decontaminated or handled as follows:

- Protective clothing and equipment will be decontaminated, cleaned, laundered, maintained or replaced as needed to maintain their effectiveness.
- Employees whose non-impermeable clothing becomes wetted with hazardous substances will immediately remove that clothing and proceed to shower. The clothing will be disposed of or decontaminated before it is removed from the work zone.

Unauthorized employees will not remove protective clothing or equipment from change rooms.

Commercial laundries or cleaning establishments that decontaminate protective clothing or equipment will be informed of the potentially harmful effects of exposures to hazardous substances.

Where the decontamination procedure indicates a need for regular showers and change rooms outside of a contaminated area, they will be provided and meet the requirements of 29 CFR 1910.141. If temperature conditions prevent the effective use of water, then other effective means for cleansing will be provided and used.

### Equipment Decontamination

Any equipment, vehicles, or tools that have entered an EZ will be cleaned with water. Some equipment decontamination may require pressurized water or steam cleaning. Equipment removed from the EZ will be decontaminated in the CRZ. All water and material will be collected and placed in the designated waste disposal area.

Following this cleaning, all items will be inspected and approved by the Field Supervisor prior to removal from the site. The following subsections outline procedures to be used for specific site equipment.

## Vehicles and Heavy Equipment

- Don appropriate PPE.
- Scrape or brush off gross residues.
- Pressure wash outside of equipment, paying particular attention to tires and tracks.
- Sweep and wipe down interior.
- Dispose of residues and rinse surfaces until visibly clean.

## Disposal of Decontamination Wastes

All liquids and other decontamination waste will be collected and treated as contaminated waste and disposed of properly in accordance with the applicable regulations. The Level of Protection for personnel handling and decontaminating contaminated equipment will be established in the SSHSP. Equipment must be cleaned prior to demobilization. Wash waters and residues must be collected for treatment and/or proper disposal.



## **FLD 60 EMPLOYEE DUTY SCHEDULE/BASIC FATIGUE MANAGEMENT PLAN**

For project assignments lasting longer than two weeks, WESTON employees should not work in excess of 84 hours per week unless approved by the Project Manager. The Division and Corporate EHS communities, as well as the local Operations/Resource Manager are available to support the Project Manager's decision process. Certain Federal Contracts, Regulatory Agencies, and Country-specific (non-CONUS) regulations may require more stringent limitations on work hours which will be addressed in Weston's Staffing and Work Plans.

Project Health and Safety Plans (HASPs) will address the potential for and specific employee requirements as they relate to working long hours. On project assignments requiring long work hours, Site Supervisors and/or Field Safety Officers (FSOs) will monitor employees for signs of stress-related health problems and assist employees as appropriate. Employee rotations may need to be adjusted to allow for individual differences in how fatigue-related stress is handled and for their specific role on the Project.

While working extended hours, employee travel time to and from work will be minimized to allow for sufficient rest and should be taken into account in determining hours per day and per week limits. Group transportation to and from the work location and lodging may be used to address this situation. The Project HASP will address project-related commuting and employee fatigue.

There may be extreme circumstances that require employees to work longer rotations based on given Project circumstances. If a Project requires a WESTON employee to work greater than 84 hours per week for more than two weeks, this will be addressed in the HASP and approved by the Project Manager. The HASP will address recognition of fatigue, actions to take when fatigue is noted, and appropriate and relevant elements of a Fatigue Management Plan to ensure risk mitigation. Anyone having concerns about safety issues relating to long hours should discuss these with the Project Manager, FSO, Office Safety Manager, or Division EHS Manager.

Appendix A is a Risk of Injury Table that presents data from studies where risk of injury was quantified and/or modeled. Appendix B is a reprint of an article that describes symptoms of fatigue. Additional information on fatigue, fatigue factors, and mitigation will also be posted on the Corporate EHS Portal Site.

## APPENDIX A RISK OF INJURY TABLE

### Association Between Working Extended Work Shifts/Work Weeks and Workplace Injury: Summary of Reviewed Literature

This table highlights studies that evaluated the association between hours worked and occupational injury. It presents data from several recent studies where the risk of injury has been quantified and/or modeled. None of the studies highlighted here evaluate how the implementation of a well-designed and well-managed fatigue management program would impact the risk of injury. However, it is clear from the studies that when aspects of such a program (e.g., including breaks throughout a work shift) are implemented, fatigue is reduced and performance is enhanced; the risk of injury may be similarly reduced. These data should be used collectively when designing a work schedule for an incident-specific fatigue management plan. It is “necessary to consider the various features of the schedule in combination with one another, rather than in isolation from one another” (Johnson & Lipscomb, 2006).

Reference	Risk of Injury (as compared with working 8-hr work day, working during the day shift, and working a 40 hr work week)					
	10-hr work shift	12-hour work shift	afternoon work shift	night work shift	successive shifts	> 40-hr work week
S. Vegso, et al, 2007						↑ by 88% for those who worked more than 64 hr during the previous week
Folkhard & Lombardi, 2006  (model using results from numerous studies)	↑ by 13%	↑ by 27.5%	↑ by 15.2%	↑ by 27.9%	Night Shifts: ↑ by 6% for 2 <sup>nd</sup> night worked ↑ by 17% for 3 <sup>rd</sup> night worked ↑ by 36% for 4 <sup>th</sup> night worked  Day Shifts: ↑ by 2% for 2 <sup>nd</sup> day worked ↑ by 7% for 3 <sup>rd</sup> day worked ↑ by 17% for 4 <sup>th</sup> day worked	Varies based on length of shift and time of day. For any given work week duration, a long span of short shifts is likely to be safer than a short span of long shifts.  60 hour week – as 6 10-hr days: ↑ by 16% (day) ↑ by 54% (night)  as 5 12-hr days: ↑ by 28% (day) ↑ by 62% (night)
Dembe, et al, 2005		↑ by 37%				↑ by 23% (60 hrs/week)

Reference	Risk of Injury (as compared with working 8-hr work day, working during the day shift, and working a 40 hr work week)					
	10-hr work shift	12-hour work shift	afternoon work shift	night work shift	successive shifts	> 40-hr work week
Dong, 2005	↑ by 57% (> 8 hrs; construction workers)					↑ by 98% (> 50 hrs; all occupations)
Folkhard & Lombard, 2004	↑ by 13%	↑ by 27.5%	↑ by 18.3%	↑ by 30.4%	Night Shifts: ↑ by 6% for 2 <sup>nd</sup> night worked ↑ by 17% for 3 <sup>rd</sup> night worked ↑ by 36% for 4 <sup>th</sup> night worked  Day Shifts: ↑ by 2% for 2 <sup>nd</sup> day worked ↑ by 7% for 3 <sup>rd</sup> day worked ↑ by 17% for 4 <sup>th</sup> day worked	
Folkhard & Tucker 2003,			↑ by 18.3%	↑ by 30.4%	Night Shifts: ↑ by 6% for 2 <sup>nd</sup> night worked ↑ by 17% for 3 <sup>rd</sup> night worked ↑ by 36% for 4 <sup>th</sup> night worked  Day Shifts: ↑ by 2% for 2 <sup>nd</sup> day worked ↑ by 7% for 3 <sup>rd</sup> day worked ↑ by 17% for 4 <sup>th</sup> day worked	
Baker, 2003*	no significant ↑; accidents peaked – 10 <sup>th</sup> hour (day shift) and 12 <sup>th</sup> hour (night shift)					

Reference	Risk of Injury (as compared with working 8-hr work day, working during the day shift, and working a 40 hr work week)					
	10-hr work shift	12-hour work shift	afternoon work shift	night work shift	successive shifts	> 40-hr work week
Johnson & Sharit, 2001*		No significant ↑ (switched from 8- to 12-hr work shift)				

\* “Research comparing 8- and 12-hour shift schedules has not consistently reported increases in health and safety risks with longer shift durations. Some of the 12-hr shift schedules offset longer shifts with fewer consecutive work days (a “compressed” work week) and more rest days so that total hours approximate a 40-hr week. Fewer commutes may be another offsetting advantage. Thus, future research needs to consider potential interactions of shift length with length of work week, opportunity for rest, and commuting requirements.” (Caruso et al., 2006)

Considerations for evaluating data included in this table:

- This table highlights studies that evaluate the relationship between hours worked and risk of injury. It presents data from several recent studies where this relationship has been quantified or modeled. There are numerous studies that evaluate the relationship between hours worked and other health effects, which are of equal importance in understanding the full range of effects that workers may experience when working extended work shifts, work weeks, and work rotations. Many of these studies are highlighted in the literature review presented in this Appendix.
- None of the studies evaluated recovery workers during disaster operation.
- Most of the studies included individuals working in a broad range of occupations, or focused on a single manufacturing or market sector. The study lead by Dong focused on construction workers, an occupation that is frequently involved in recovery operation, but did not focus on construction operations during disaster recovery.
- All of the studies have design and data limitations – it is important to understand these when evaluating the data presented in the study and in this table.
- The type and severity of injury is not well defined in the studies reviewed. Folkard and Lombardi (2006) note that “in the vast majority of cases the incidents on which these trends are based were not severe, but it is likely that they represent a relatively direct measure of the occurrence of mistakes and omissions.” Injury severity likely varies among the individuals within each study and between the studies evaluated.

## APPENDIX B YOU MIGHT BE FATIGUED IF....

by Frederick V. Malmstrom, Ph.D., CPE from *Flying Safety*, February 1997, pg 14-15 (Reprinted by permission.)

The National Transportation Safety Board (NTSB) doesn't consider fatigue a "cause" of aviation mishaps. Rather, as a "contributing factor." Personally, I think this kind of reasoning is more an exercise in semantics than reality. But, whatever the causes, the results of fatigue can be deadly.

So, what on earth is fatigue? It is, as psychologists are fond of saying, a theoretical construct. Nobody can measure it, weight it, time it, smell it, or place any physical units on it—yet everyone agrees it exists. It's been said that for every two Frenchmen who meet in a coffee house, a new political party is formed. It's also said that for every psychologist who writes an article on fatigue, a new definition of fatigue is created.

Fatigue is typified by symptoms of inattention, degraded judgment, poor motor skills, exhaustion, confusion, and a whole long list of other effects. (See table 1.)

I have experienced the near-fatal side effects of fatigue. This was an instance when we'd been up flying combat all night and coasted in sleepily for a dawn landing. The brakes somehow had collected water and froze. During the half-second of fatigue-induced inattention after touchdown, our EB-66C's brakes locked up, and we spun into the infield grass. Happily, all six of us walked (well, ran) away from that one.

### THE FOUR CAUSES OF FATIGUE

As researchers Richard Adams of Advanced Aviation Concepts and Dr. Alan Stokes of the Florida Institute of Technology (1995) warn, fatigue is much more than just sleep deprivation. There are at least four known causes:

1. Inadequate rest.
2. Desynchronized physiological circadian rhythms.
3. Weariness following physical activity.
4. Impaired judgment following prolonged mental activity.

And any or all of the above-mentioned causes are enough to induce fatigue.

### FATIGUE-INDUCED ERRORS

Even though the NTSB says fatigue doesn't "cause" mishaps, research shows it sure causes errors. As students of the theory of signal detection know, there are only two categories of flying errors: (1) *errors of commission*, and (2) *errors of omission*.

Unfortunately, fatigue causes both categories of error, although the error of *omission* is by far the most common.

Adams and Stokes cited a classic 1948 U.K. study in which fatigued subjects flying a simulator made numerous errors of omission followed by several "catch-up" errors of commission. Talk about making a bad situation badder!

What are the most common fatigue-induced flight errors? Well, for instance, in 1995, Dr. J. C. Wilson of Leicester University and Capt A. Elsey and Mr. P. Hunton of British Airline Pilots' Association (BAPA) surveyed over 1,000 U.K. commercial pilots and flight engineers. Although no single type of fatigue-related error is overwhelming the "miscommunication"\* error seems to come up more frequently. Their

study found a shotgun spread of fatigue-related errors—probably because fatigue is a *global* thing. When you fly long hours, you fatigue your entire person—not just your eyes, not just your mind, and not even just your backside. The nasty thing about fatigue is that it seems to lower your all-around ability to *integrate* the parts of the puzzle.

Fatigued individuals have limited attention—they see the trees but not the forest. For instance, older (like me) people are especially vulnerable to fatigue. That’s probably in no small part due to our reduced brain, skeletal, and muscle mass. There is simply physically less of us to cope with the global problems of the world.

## HOW DO YOU RECOGNIZE FATIGUE?

Unfortunately, fatigue, like hypoxia, tends to sneak up on the victim gradually and isn’t always easy to recognize. Having worked with mental patients for years, I’ve noted that the truly psychotic persons are themselves the last to know that they’re crazy. Hence, they must rely on outside observers to point this out to them, and even then, these disturbed persons often won’t accept the fact. Likewise, fatigued persons tend to be in denial and wouldn’t always recognize fatigue if it bit them.

Dr. Richard F. Haines and C. Flatau, in their book *Night Flying* (1992), have taken the time to table some observable effects of fatigue. I’ve condensed some of their findings into Table 1. Note that some of the effects can be seen only by you (intrinsic symptoms). Extrinsic symptoms are easily seen only by others. Please take the time to note the extrinsic symptoms. They’re the kind of behaviors which the individual typically ignores but the outsider should be able to spot rather easily.

If you aren’t able to recognize your own fatigue symptoms, the least you can do is recognize these fatigue symptoms in others. And, if you do, you can say, “You might be fatigued if...you have these symptoms.” I’d have been grateful if someone had brought that to my attention on that morning 30 years ago while I was landing in the EB-66C.

\*Miscommunication is a hot topic in aviation research. CRM-crew resource management (aka cockpit resource management)—analyzes things like crew workload, social interactions, and (mis)communications. For further reading, see Maj. Eric Offil’s article, “Cockpit Resource Management,” in the September 1996 *Flying Safety*.

**Table 1. You might be fatigued if...you have these observable effects of fatigue  
(from Haines & Flatau, 1992)**

WHAT YOU SEE:	
INTRINSIC SYMPTOMS	
A. PHYSICAL	1. Frequent, unexplainable headaches
	2. Muscular aches and pains
	3. Breathing difficulties
	4. Blurred/double vision
	5. Burning urination
B. MENTAL	1. Attentional focusing
	2. Easily distracted
	3. Reduced flying standards
	4. Feeling of depression
	5. Impaired judgment
	6. Poor visual perception

<b>WHAT OTHERS SEE:</b>	
<b>EXTRINSIC SYMPTOMS</b>	
<b>A. PHYSICAL</b>	1. Degraded motor skills
	2. Tenseness and tremors
	3. Intolerant/irritable
	4. Increased reaction time
	5. Social withdrawal
<b>B. MENTAL</b>	1. Absentmindedness
	2. Poor short-term memory
	3. Lack of interest and drive
	4. Confused and fearful
	5. Slow startle response
	6. Worried and anxious





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**ATTACHMENT D**  
**HAZARD COMMUNICATION PROGRAM**

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## SITE-SPECIFIC HAZARD COMMUNICATION PROGRAM

### ***Location-Specific Hazard Communication Program/Checklist***

To ensure an understanding of and compliance with the Hazard Communication Standard, WESTON will use this checklist/document (or similar document) in conjunction with the WESTON Written Hazard Communication Program as a means of meeting site- or location-specific requirements.

While responsibility for activities within this document reference the WESTON Safety Officer (SO), it is the responsibility of all personnel to effect compliance. Responsibilities under various conditions can be found within the WESTON Written Hazard Communication Program.

To ensure that information about the dangers of all hazardous chemicals used by WESTON are known by all affected employees, the following Hazard Communication Program has been established. All affected personnel will participate in the Hazard Communication Program. This written program, as well as WESTON's Corporate Hazard Communication Program, will be available for review by any employee, employee representative, representative of OSHA, NIOSH, or any affected employer/employee on a multi-employer site.

- ☒ Site or other location name/address: 4910 W 86<sup>th</sup> St, Indianapolis, IN
- ☒ Site/Project/Location Manager: PM- Rick Mehl
- ☒ Site/Location Safety Officer: Tonya Balla
- ☒ List of chemicals compiled, format: ☒ HASP ☐ Other: \_\_\_\_\_
- ☐ Location of MSDS files: \_\_\_\_\_
- ☐ Training conducted by: Name: \_\_\_\_\_ Date: \_\_\_\_\_
- ☐ Indicate format of training documentation: ☐ Field Log: ☐ Other: \_\_\_\_\_
- ☐ Client briefing conducted regarding hazard communication: \_\_\_\_\_
- ☐ If multi-employer site (client, subcontractor, agency, etc.), indicate name of affected companies: \_\_\_\_\_
- ☐ Other employer(s) notified of chemicals, labeling, and MSDS information: \_\_\_\_\_
- ☐ Has WESTON been notified of other employer's or client's hazard communication program(s), as necessary? ☐ Yes ☐ No

### ***List of Hazardous Chemicals***

A list of known hazardous chemicals used by WESTON personnel must be prepared and attached to this document or placed in a centrally identified location with the MSDSs. Further information on each chemical may be obtained by reviewing the appropriate MSDS. The list will be arranged to enable cross-reference with the MSDS file and the label on the container. The SO or Location Manager is responsible for ensuring the chemical listing remains up-to-date.

### ***Container Labeling***

The WESTON SO will verify that all containers received from the chemical manufacturer, importer, or distributor for use on-site are clearly labeled.

The SO is responsible for ensuring that labels are placed where required and for comparing MSDSs and other information with label information to ensure correctness.

### ***Material Safety Data Sheets (MSDSs)***

The SO is responsible for establishing and monitoring WESTON's MSDS program for the location. The SO will ensure that procedures are developed to obtain the necessary MSDSs and will review incoming MSDSs for new or significant health and safety information. He/she will see that any new information is passed on to the affected employees. If an MSDS is not received at the time of initial shipment, the SO will call the manufacturer and have an MSDS delivered for that product in accordance with the requirements of WESTON's Written Hazard Communication Program.

A log for, and copies of, MSDSs for all hazardous chemicals in use will be kept in the MSDS folder at a location known to all site workers. MSDSs will be readily available to all employees during each work shift. If an MSDS is not available, immediately contact the WESTON SO or the designated alternate. When a revised MSDS is received, the SO will immediately replace the old MSDS.

### ***Employee Training and Information***

The SO is responsible for the WESTON site-specific personnel training program. The SO will ensure that all program elements specified below are supplied to all affected employees.

At the time of initial assignment for employees to the work site, or whenever a new hazard is introduced into the work area, employees will attend a health and safety meeting or briefing that includes the information indicated below.

- Hazardous chemicals present at the work site.
- Physical and health risks of the hazardous chemicals.
- The signs and symptoms of overexposure.
- Procedures to follow if employees are overexposed to hazardous chemicals.
- Location of the MSDS file and Written Hazard Communication Program.
- How to determine the presence or release of hazardous chemicals in the employee's work area.
- How to read labels and review MSDSs to obtain hazard information.
- Steps WESTON has taken to reduce or prevent exposure to hazardous chemicals.
- How to reduce or prevent exposure to hazardous chemicals through the use of controls procedures, work practices, and personal protective equipment.
- Hazardous, nonroutine tasks to be performed (if any).
- Chemicals within unlabeled piping (if any).

### ***Hazardous Nonroutine Tasks***

When employees are required to perform hazardous nonroutine tasks, the affected employee(s) will be given information by the SO about the hazardous chemicals he or she may use during such activity. This information will include specific chemical hazards, protective and safety measures the employee can use, and steps WESTON is using to reduce the hazards. These steps include, but are not limited to, ventilation, respirators, presence of another employee, and emergency procedures.

### ***Chemicals in Unlabeled Pipes***

Work activities may be performed by employees in areas where chemicals are transferred through unlabeled pipes. Prior to starting work in these areas, the employee will contact the SO, at which time information as to the chemical(s) in the pipes, potential hazards of the chemicals or the process involved, and the safety precautions that should be taken will be determined and presented.

### ***Multi-Employer Work Sites***

It is the responsibility of the SO to provide other employers with information about hazardous chemicals imported by WESTON to which their employees may be exposed, along with suggested safety precautions. It is also the responsibility of the SO and the Site Manager to obtain information about hazardous chemicals used by other employers to which WESTON employees may be exposed. WESTON's chemical listing will be made available to other employers, as requested. MSDSs will be available for viewing, as necessary.

The location, format, and/or procedures for accessing MSDS information must be relayed to affected employees.

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**ATTACHMENT E**  
**AIR SAMPLING DATA SHEETS**

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## SITE AIR MONITORING PROGRAM

### Field Data Sheets

**Location:**

% LEL	% O <sub>2</sub>	PID (units)	FID (units)	Aerosol Monitor (mg/m <sup>3</sup> )	GM: Shield Probe/ Thin Window		NaI (uR/hr)	ZnS (cpm)
					mR/hr	cpm		
Monitox (ppm)				Detector Tube(s)				
Sound Levels (dBA)		Illumination	pH	Other	Other	Other	Other	Other

**Location:**

% LEL	% O <sub>2</sub>	PID (units)	FID (units)	Aerosol Monitor (mg/m <sup>3</sup> )	GM: Shield Probe/ Thin Window		NaI (uR/hr)	ZnS (cpm)
					mR/hr	cpm		
Monitox (ppm)				Detector Tube(s)				
Sound Levels (dBA)		Illumination	pH	Other	Other	Other	Other	Other

AIR MONITORING/SAMPLING DATA LOG					
Client:		W.O. No.:		Sample No.:	
Address:		Sampled By:		Date:	
Employee and Location Information					
Employee Name:		Employee No.:		Job Title:	
<b>Respirator</b> <input type="checkbox"/> APR <input type="checkbox"/> ½ Mask <input type="checkbox"/> Full Face <input type="checkbox"/> PAPR <input type="checkbox"/> ½ Mask <input type="checkbox"/> Full Face <input type="checkbox"/> Hood <input type="checkbox"/> SAR <input type="checkbox"/> ½ Mask <input type="checkbox"/> Full Face <input type="checkbox"/> Hood <input type="checkbox"/> SCBA		<b>Manufacturer:</b>		<b>Cartridge Type:</b>	
<b>PPE:</b> <input type="checkbox"/> Hard Hat <input type="checkbox"/> HPD <input type="checkbox"/> Gloves <input type="checkbox"/> Safety Shoes <input type="checkbox"/> Coveralls <input type="checkbox"/> Other:					
Sampling Data					
<b>Sampling Type:</b> <input type="checkbox"/> Personal <input type="checkbox"/> TWA <input type="checkbox"/> STEL <input type="checkbox"/> Area <input type="checkbox"/> Source <input type="checkbox"/> Full Shift <input type="checkbox"/> Partial Shift <input type="checkbox"/> Grab		<b>Media:</b>		<b>Pump Type/Serial No.:</b> /	
<b>Calibrator/Serial No.:</b> /		<b>Pre-Calibration:</b> 1. 2. 3. <b>avg-pre:</b>		<b>Post-Calibration:</b> 1. 2. 3. <b>avg-post:</b>	
<b>Start Time:</b>	<b>Restart Time:</b>	<b>Restart Time:</b>	<b>Avg. Flowrate:</b>	<b>% Change:</b>	
<b>1<sup>st</sup> Stop Time:</b>	<b>2<sup>nd</sup> Stop Time:</b>	<b>3<sup>rd</sup> Stop Time:</b>	<b>Total Time:</b>	<b>Volume:</b>	
<b>Multiple Samples for this TWA:</b> <input type="checkbox"/> Yes <input type="checkbox"/> No		<b>Multiple Chemical Exposures:</b> <input type="checkbox"/> Yes <input type="checkbox"/> No		<b>Exposure Time:</b> <input type="checkbox"/> Normal <input type="checkbox"/> Worst Case	
Sampling Conditions					
<b>Weather Conditions:</b> Temp:    R.H:    B.P.:    Other:					
<b>Engineering Controls:</b>					
Substances Evaluated					
<b>Substance</b>	<b>Result</b>	<b>Substance</b>	<b>Result</b>	<b>Substance</b>	<b>Result</b>
Observations and Comments					

QA by: \_\_\_\_\_

Date: \_\_\_\_\_

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## **ATTACHMENT F INCIDENT REPORTING**

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..Welcome to NOITrack.: - Windows Internet Explorer

http://prdnet/noitrack/IncidentInfo.aspx

File Edit View Favorites Tools Help

Google Search Bookmarks Check AutoFill Sign In

..Welcome to NOITrack.:

NOITrack

Open NOI's Search Add New Incident Reports Admin Help Blog

Incident Info Individual Data Investigation File Attachment

☐ Near Incident

Fields marked with \* are required

Security	Safety	Computer	Other
<input type="checkbox"/> Threat or Intimidation	<input type="checkbox"/> Vehicle	<input type="checkbox"/> Computer/Technology	<input type="checkbox"/> Environmental
<input type="checkbox"/> Act of Violence	<input type="checkbox"/> Injury	<input checked="" type="checkbox"/> Other	<input type="checkbox"/> Property/Equipment Damage
<input type="checkbox"/> Theft	<input type="checkbox"/> Illness		<input type="checkbox"/> Regulatory Agency
<input type="checkbox"/> Vandalism	<input type="checkbox"/> Exposure		<input type="checkbox"/> Other
<input type="checkbox"/> Violation of Company or Government Security Requirements	<input type="checkbox"/> Other Safety		
<input type="checkbox"/> Other Security			

Was this a single event or the latest in a series(describe)?

Note: This description is limited to 255 characters. If more information is required, add the information in the submitted description.

Date of Incident \*

Time of Incident \*  Hrs  min  AM  PM

☐ Unknown Date ☐ Unknown Time

Done Local intranet 100%

Please go to NOITrack using the following link to complete incident reporting. If you are in the field and do not have access to NOITrack, please contact someone in your office to do the reporting for you.

<http://prdnet/noitrack/IncidentInfo.aspx>

Questions can be directed to Susan Hipp-Ludwick at 610.701.3046 or Matt Dillon at 610.701.3667



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**ATTACHMENT G**  
**AHA CHECKLIST AND ENVIRONMENTAL COMPLIANCE**

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<b>HAZARD CHECKLIST</b> Site Manager/EHS Officer: Date: Location: Address:						Task Team (name or reference via daily sign-in sheet)			
<b>HAZARDS IDENTIFIED (check those applicable)</b>									
	<b>Chemical</b>		<b>Biological</b>		<b>Physical</b>		<b>Aerial lifts</b>		<b>Remote Areas</b>
<input type="checkbox"/>	Flammable/combustible	<input type="checkbox"/>	Insects	<input type="checkbox"/>	Noise	<input type="checkbox"/>	Man. Material Handling	<input type="checkbox"/>	Materials handling
<input type="checkbox"/>	Corrosive	<input type="checkbox"/>	Animals	<input type="checkbox"/>	Heat	<input type="checkbox"/>	Demolition	<input type="checkbox"/>	High Pressure Washers
<input type="checkbox"/>	Oxidizer	<input type="checkbox"/>	Plants	<input type="checkbox"/>	Cold	<input type="checkbox"/>	Excavation	<input type="checkbox"/>	Hand and Power Tools
<input type="checkbox"/>	Reactive	<input type="checkbox"/>	Mold/Fungus	<input type="checkbox"/>	Inclement Weather	<input type="checkbox"/>	Pile Driving	<input type="checkbox"/>	Low Illumination
<input type="checkbox"/>	Toxic	<input type="checkbox"/>	Viral/Bacterial	<input type="checkbox"/>	Hot Work	<input type="checkbox"/>	Welding/Cutting/Burn	<input type="checkbox"/>	Drilling & Boring
<input type="checkbox"/>	Inhalation	<input type="checkbox"/>	Density Gauges	<input type="checkbox"/>	Confined Spaces	<input type="checkbox"/>	Hot Surfaces	<input type="checkbox"/>	Striking against/Struck-by
<input type="checkbox"/>	Eyes/Skin	<input type="checkbox"/>	Radiological	<input type="checkbox"/>	Stored hazardous Energy	<input type="checkbox"/>	Hot Materials	<input type="checkbox"/>	Caught-in/Caught between
<input type="checkbox"/>	Pesticides	<input type="checkbox"/>	Ultra-Violet	<input type="checkbox"/>	Elevation	<input type="checkbox"/>	Rough Terrain	<input type="checkbox"/>	Pushing/pulling
<input type="checkbox"/>	Carcinogen	<input type="checkbox"/>	Sunlight	<input type="checkbox"/>	Utilities	<input type="checkbox"/>	Compressed Gases	<input type="checkbox"/>	Falls at same level
<input type="checkbox"/>	Asbestos	<input type="checkbox"/>	Infrared	<input type="checkbox"/>	Machinery	<input type="checkbox"/>	Hazardous Mat. Storage	<input type="checkbox"/>	Falls from elevation
<input type="checkbox"/>	Lead	<input type="checkbox"/>	Lasers	<input type="checkbox"/>	Mobile equipment	<input type="checkbox"/>	Diving	<input type="checkbox"/>	Repetitive motion
<input type="checkbox"/>	UXO/OE/ CWM	<input type="checkbox"/>	XRF	<input type="checkbox"/>	Cranes	<input type="checkbox"/>	Operation of Boats	<input type="checkbox"/>	High (>110v) Electricity
<input type="checkbox"/>	Process Safety	<input type="checkbox"/>	Isotopes	<input type="checkbox"/>	Manual Material Handling	<input type="checkbox"/>	Working Over Water	<input type="checkbox"/>	Slippery surface Ice/Snow
<input type="checkbox"/>	Applying Paint/Coatings	<input type="checkbox"/>		<input type="checkbox"/>	Ladders	<input type="checkbox"/>	Traffic	<input type="checkbox"/>	
<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	Scaffolding	<input type="checkbox"/>	Site Security	<input type="checkbox"/>	
<b>REQUIRED PROTECTION (check those applicable)</b>									
	<b>Engineering Controls</b>		<b>Administrative Control</b>		<b>PPE</b>				<b>Contingency</b>
<input type="checkbox"/>	Guard Rails	<input type="checkbox"/>	Qualified for task	<input type="checkbox"/>	Air Supplying Respirator	<input type="checkbox"/>	Tyvek coveralls	<input type="checkbox"/>	Emergency Signal Known
<input type="checkbox"/>	Machine Guards	<input type="checkbox"/>	Trained/Certified	<input type="checkbox"/>	Air Purifying Respirator	<input type="checkbox"/>	Coated Coveralls	<input type="checkbox"/>	Eye wash/shower Location
<input type="checkbox"/>	Sound Barriers	<input type="checkbox"/>	Hot Work Permit	<input type="checkbox"/>	SCBA	<input type="checkbox"/>	Welding leathers	<input type="checkbox"/>	First Aid Kit Location
<input type="checkbox"/>	Enclosure	<input type="checkbox"/>	CSE Permit	<input type="checkbox"/>	Hard Hat	<input type="checkbox"/>	CWM	<input type="checkbox"/>	Fire Extinguisher Location
<input type="checkbox"/>	Elevation	<input type="checkbox"/>	Lockout/Tag Out	<input type="checkbox"/>	Ear Plugs	<input type="checkbox"/>	Safety Shoes/Boots	<input type="checkbox"/>	Spill Kit Location
<input type="checkbox"/>	Isolation	<input type="checkbox"/>	Work Permit	<input type="checkbox"/>	Ear Muffs	<input type="checkbox"/>	Rubber Boots	<input type="checkbox"/>	Severe weather shelter
<input type="checkbox"/>	GFCI	<input type="checkbox"/>	Dig Safe Permit	<input type="checkbox"/>	Safety Glasses	<input type="checkbox"/>	Gloves	<input type="checkbox"/>	Evacuation Routes
<input type="checkbox"/>	Assured Ground Program	<input type="checkbox"/>	Contingency Plan	<input type="checkbox"/>	Goggles	<input type="checkbox"/>	Cooling Suits		
<input type="checkbox"/>	Apply Anti-slip/skid Mat	<input type="checkbox"/>	Critical Lift Plans	<input type="checkbox"/>	Chemical Goggles	<input type="checkbox"/>	Ice Vests		
		<input type="checkbox"/>	Equip. Inspection Sheets	<input type="checkbox"/>	Face Shield	<input type="checkbox"/>	Radiant heat Suits		
				<input type="checkbox"/>	Thermal Shield	<input type="checkbox"/>	Fall Arrest		
				<input type="checkbox"/>	Welding Mask	<input type="checkbox"/>	PFD		
				<input type="checkbox"/>	Cutting Glasses	<input type="checkbox"/>	Electrical insulation		
Any Modification to Tasks (list)				Other tasks or activities that may affect my activity			Reasons for any changes indicated above		

### **Environmental Compliance Considerations:**

<input type="checkbox"/>	Generation of Hazardous Waste*	<input type="checkbox"/>	→Waste Identification & Manifesting - Marking, Placarding, Labeling
<input type="checkbox"/>	Generation of Investigation Derived Waste*	<input type="checkbox"/>	→Training & Licensing for Use of Radioactive Materials/Sources
<input type="checkbox"/>	Treatment, Storage, or Disposal of Hazardous Waste*	<input type="checkbox"/>	→ Containers: dated, labeled, closed, full, stored less than 90 days
<input type="checkbox"/>	Contingency to prevent or contain hazardous materials or oil spills or discharges to drains, body of water, soil*	<input type="checkbox"/>	→ Risk of explosion or catastrophic release due to chemical storage or processing involving reactivity, flammables, solvents or explosives
<input type="checkbox"/>	Disturbing of Asbestos Containing Materials (ACM)*	<input type="checkbox"/>	→Training & Licensing for Asbestos Remediation Activities
<input type="checkbox"/>	Application of Pesticides or Herbicides*	<input type="checkbox"/>	
<input type="checkbox"/>	Work on Above or Under-ground Storage Tanks*	<input type="checkbox"/>	
<input type="checkbox"/>	Transportation, Storage or Disposal of Radioactive Material*	<input type="checkbox"/>	
<input type="checkbox"/>	Activities producing or generating Air Emissions (or fugitive "fence-line" emissions) requiring either monitoring and/or permit*	<input type="checkbox"/>	
<input type="checkbox"/>	Excavations, Drilling, Probing or other activities that could impact underground utilities, pipelines, sewer or treatment systems.	<input type="checkbox"/>	
<input type="checkbox"/>	Shipment of Hazardous Waste off-site*	<input type="checkbox"/>	
<input type="checkbox"/>	Shipment of Samples in accordance with DOT/IATA	<input type="checkbox"/>	

\* Indicates need for an environmental compliance plan.

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## **ATTACHMENT H TRAFFIC CONTROL PLAN**

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Insert documents on following page.



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## **ATTACHMENT I AUDIT FORMS**

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Insert documents on following page.



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**ATTACHMENT J**  
**ENVIRONMENTAL HEALTH & SAFETY INSPECTION CHECKLIST**

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## ENVIRONMENTAL HEALTH AND SAFETY INSPECTION CHECKLIST

Project Name: \_\_\_\_\_

Inspector: \_\_\_\_\_

Submit to: \_\_\_\_\_

Date: \_\_\_\_\_

# ENVIRONMENTAL HEALTH AND SAFETY INSPECTION CHECKLIST

## THE WESTON SITE APPEARANCE

YES	NO		COMMENT
<input type="checkbox"/>	<input type="checkbox"/>	Is the site secured to prevent inadvertent, unnecessary, or unauthorized access? Are gates closed and locked at any time that the access point is not occupied or visible to site workers?	
<input type="checkbox"/>	<input type="checkbox"/>	Are access points posted with signs to indicate client and end-user client name, WESTON's name and logo, names of other contractors and sub-contractors, project name and location, and appropriate safety messages?	
<input type="checkbox"/>	<input type="checkbox"/>	Are required postings in place (e.g., Labor Poster, Emergency Phone Numbers, Site Map, etc.)?	
<input type="checkbox"/>	<input type="checkbox"/>	Are site trailers tied down per local code and provided with stairs that have a landing platform with guard and stair railings?	
<input type="checkbox"/>	<input type="checkbox"/>	Is a Site Safety file system established in the office to maintain records required by applicable safety regulations	
<input type="checkbox"/>	<input type="checkbox"/>	Is the Health and Safety Plan (HASP) or Accident Prevention Plan (APP) amended as scope of work changes, hazards are discovered or eliminated or if risk change?	
<input type="checkbox"/>	<input type="checkbox"/>	Is the Site Safety Plan and the Safety Officers Field Manual on site?	
<input type="checkbox"/>	<input type="checkbox"/>	Is new employee indoctrination provided?	
<input type="checkbox"/>	<input type="checkbox"/>	Have site Rules been provided, discussed and signed off on by all employees	
<input type="checkbox"/>	<input type="checkbox"/>	Incident Reporting procedure explained to all?	
<input type="checkbox"/>	<input type="checkbox"/>	Is site management trained in the WESTON (and client as applicable) Incident Reporting system?	
<input type="checkbox"/>	<input type="checkbox"/>	Are NOI and Supplemental Report forms and OSHA 300 Log available on site?	
<input type="checkbox"/>	<input type="checkbox"/>	Is Site Management aware of the Case Management and Incident Investigation Procedures?	
<input type="checkbox"/>	<input type="checkbox"/>	Is there a list of preferred provider medical facilities available?	
<input type="checkbox"/>	<input type="checkbox"/>	Has the "Inspection By A Regulatory Agency" procedure been reviewed by all site management?	
<input type="checkbox"/>	<input type="checkbox"/>	Will Competent Persons be required because of activities to be performed, equipment to be used or hazards to be encountered?	

## POLICIES

YES	NO		COMMENT
<input type="checkbox"/>	<input type="checkbox"/>	Each individual employee is aware that he or she responsible for complying with applicable safety requirements, wearing prescribed safety equipment and preventing avoidable accidents.	
<input type="checkbox"/>	<input type="checkbox"/>	Do employees understand that they will wear clothing suitable for existing weather and work conditions and the minimum work uniform will include long pants, sleeved work shirts, protective footwear, hard hat, and safety glasses unless otherwise specified via the HASP.	
<input type="checkbox"/>	<input type="checkbox"/>	Are employees provided safety and health training to enable them to perform their work safely ? Is all training documented to indicate the date of the session, topics covered, and names of participants?	
<input type="checkbox"/>	<input type="checkbox"/>	Safety meetings are conducted daily. The purpose of the meetings are to review past activities, review pertinent tailgate safety topics and establish safe working procedures for anticipated hazards encountered during the day.	
<input type="checkbox"/>	<input type="checkbox"/>	Training has been provided to all personnel regarding handling of emergency situations that may arise from the activity or use of equipment on the project.	
<input type="checkbox"/>	<input type="checkbox"/>	Employees/contractors are informed and understand that they may not be under the influence of alcohol, narcotics, intoxicants or similar mind-altering substances at any time. Employees found under the influence of or consuming such substances will be immediately removed from the job site.	
<input type="checkbox"/>	<input type="checkbox"/>	Site workers and operators of any equipment or vehicles are able to read and understand the signs, signals and operating instructions of their use.	
<input type="checkbox"/>	<input type="checkbox"/>	Have contractors performing work provided copies of relevant documentation (such as medical fit-for-duty, training certificates, fit-tests, etc.) prior to initiation of the project?	

# ENVIRONMENTAL HEALTH AND SAFETY INSPECTION CHECKLIST

## SANITATION 29 CFR 1926 Subparts C, D. EM 385-1-1, Section 2

YES	NO		COMMENT
<input type="checkbox"/>	<input type="checkbox"/>	Is an adequate supply of drinking water provided. Is potable/drinking water labeled as such? Are there sufficient drinking cups provided?	
<input type="checkbox"/>	<input type="checkbox"/>	Is there a sufficient number of toilets?	
<input type="checkbox"/>	<input type="checkbox"/>	Are washing facilities readily available and appropriate for the cleaning needs?	
<input type="checkbox"/>	<input type="checkbox"/>	Are washing facilities kept sanitary with adequate cleansing and drying materials?	
<input type="checkbox"/>	<input type="checkbox"/>	Waste is secured so as not to attract rodents, insects or other vermin?	
<input type="checkbox"/>	<input type="checkbox"/>	Is an effective housekeeping program established and implemented?	

## ACCIDENT PREVENTION SIGNS, TAGS, LABELS, SIGNALS, AND PIPING SYSTEM IDENTIFICATION 29 CFR 1926 Subpart G. EM 385-1-1, Section 8

YES	NO		COMMENT
<input type="checkbox"/>	<input type="checkbox"/>	Are signs, tags, and labels provided to give adequate warning and caution of hazards and instruction/directions to workers and the public?	
<input type="checkbox"/>	<input type="checkbox"/>	Are all employees informed as to the meaning of the various signs, tags and labels used in the workplace and what special precautions are required?.	
<input type="checkbox"/>	<input type="checkbox"/>	Are construction areas posted with legible traffic signs at points of hazard?	
<input type="checkbox"/>	<input type="checkbox"/>	Are signs required to be seen at night lighted or reflectorized?	
<input type="checkbox"/>	<input type="checkbox"/>	Tags contain a signal word ("danger" or "caution") and a major message to indicate the specific hazardous condition or the instruction to be communicated to the employee. Tags follow requirements as outlined in 29 CFR 1926.200.	

## MEDICAL SERVICES AND FIRST AID 29 CFR 1926 Subparts C, D. EM 385-1-1, Section 3

YES	NO		COMMENT
<input type="checkbox"/>	<input type="checkbox"/>	Is a local medical emergency facility (LMEF) identified in the HASP or APP?	
<input type="checkbox"/>	<input type="checkbox"/>	Has the LMEF been visited to verify the directions and establish contacts?	
<input type="checkbox"/>	<input type="checkbox"/>	Has site management reviewed WESTON's incident management procedures?	
<input type="checkbox"/>	<input type="checkbox"/>	Have clinics and specialists that will help WESTON manage injuries and illnesses been identified?	
<input type="checkbox"/>	<input type="checkbox"/>	Is there at least two (2) people certified in First Aid and CPR?	
<input type="checkbox"/>	<input type="checkbox"/>	Are first aid kits available at the command post and appropriate remote locations?	
<input type="checkbox"/>	<input type="checkbox"/>	Are first Aid Kits and Eyewash/Safety Showers inspected weekly?	
<input type="checkbox"/>	<input type="checkbox"/>	Are 15 minute eyewash/safety showers in place if required.	

# ENVIRONMENTAL HEALTH AND SAFETY INSPECTION CHECKLIST

## FIRE PREVENTION AND PROTECTION 29 CFR 1926 Subpart F. EM 385-1-1, Section 9

YES	NO		COMMENT
<input type="checkbox"/>	<input type="checkbox"/>	Is an Emergency Response and Contingency Plan in place?	
<input type="checkbox"/>	<input type="checkbox"/>	Are emergency phone numbers posted?	
<input type="checkbox"/>	<input type="checkbox"/>	Are fire extinguishers selected and provided based on the types of materials and potential fire classes in each area.	
<input type="checkbox"/>	<input type="checkbox"/>	Are fire extinguishers provided in each administrative and storage trailer, within 50 ft but no closer than 25 ft of any fuel or flammable liquids storage, on welding and cutting equipment, on mechanical equipment?	
<input type="checkbox"/>	<input type="checkbox"/>	Are fire extinguishers checked daily and inspected monthly?	
<input type="checkbox"/>	<input type="checkbox"/>	Do site personnel know the location of fire extinguishers and how to use them?	
<input type="checkbox"/>	<input type="checkbox"/>	Are flammable and combustible liquids stored in approved containers?	
<input type="checkbox"/>	<input type="checkbox"/>	Safety cans are used for dispensing flammable or combustible liquids in 5 gallon or less volumes.	
<input type="checkbox"/>	<input type="checkbox"/>	Are flammable and combustible liquids stored in flammable storage cabinets or appropriate storage areas?	
<input type="checkbox"/>	<input type="checkbox"/>	Are flammable materials separated from oxidizers by at least 20 feet (or 5 foot tall, ½ -hour rated fire wall) when in storage?	
<input type="checkbox"/>	<input type="checkbox"/>	Are fuel storage tanks double walled or placed in a lined berm?	
<input type="checkbox"/>	<input type="checkbox"/>	Spills are cleaned up immediately and wastes are disposed of properly.	
<input type="checkbox"/>	<input type="checkbox"/>	Combustible scrap, debris and waste material (oily rags) are stored in closed metal containers and disposed of promptly.	
<input type="checkbox"/>	<input type="checkbox"/>	Vehicle fueling tanks are grounded and bonding between the tank and vehicle being fueled is provided?	
<input type="checkbox"/>	<input type="checkbox"/>	LPG is stored, handled and used according to OSHA regulations 29 CFR 1926.	
<input type="checkbox"/>	<input type="checkbox"/>	LPG cylinders are not stored indoors.	
<input type="checkbox"/>	<input type="checkbox"/>	Is a hot work permit program in place? See WESTON FLD-36	
<input type="checkbox"/>	<input type="checkbox"/>	Is smoking limited to specific areas, prohibited in flammable storage areas and are signs posted to this effect?	

## HAZARDOUS SUBSTANCES, AGENTS AND ENVIRONMENTS 29 CFR 1926 Subparts D, Z. EM 385-1-1, Sections 6, 28

YES	NO		COMMENT
<input type="checkbox"/>	<input type="checkbox"/>	Are operations, materials and equipment evaluated to determine the presence of hazardous contaminants or if hazardous agents could be released in the work environment?	
<input type="checkbox"/>	<input type="checkbox"/>	Are MSDS for substances made available at the work-site when any hazardous substance is procured, used, or stored?.	
<input type="checkbox"/>	<input type="checkbox"/>	Are all containers and piping containing hazardous substances labeled appropriately?	
<input type="checkbox"/>	<input type="checkbox"/>	Is there an inventory of hazardous substances?	
<input type="checkbox"/>	<input type="checkbox"/>	Is there a site Specific Hazard Communication Program?	
<input type="checkbox"/>	<input type="checkbox"/>	Spill kits appropriate for the hazardous materials present are on site and their location is known to spill responders.	
<input type="checkbox"/>	<input type="checkbox"/>	Is disposal of excess hazardous chemicals performed according to WESTON's guidelines and RCRA regulations.	
<input type="checkbox"/>	<input type="checkbox"/>	Before initiation of activities where there is an identified asbestos or lead hazard, is there a written plan detailing compliance with OSHA and EPA asbestos or lead abatement requirements? Does the plan comply with state and local authority, and USACE requirements, as applicable?	
<input type="checkbox"/>	<input type="checkbox"/>	Are personnel trained and provided with protection against hazards from animals, poisonous plants and insects?	

# ENVIRONMENTAL HEALTH AND SAFETY INSPECTION CHECKLIST

## PERSONAL PROTECTIVE AND SAFETY EQUIPMENT, RESPIRATORY AND FALL PROTECTION 29 CFR 1926 Subparts D, E, M. EM 385-1-1, Section 5

YES	NO		COMMENT
<input type="checkbox"/>	<input type="checkbox"/>	Do employees understand that the minimum PPE is hard hat, safety glasses with side shields and safety shoes or boots and that long pants and a sleeved shirt are required?	
<input type="checkbox"/>	<input type="checkbox"/>	Has the SSHC reviewed the PPE requirements in the HASP against actual site conditions and certified that the PPE is appropriate? (see Field Manual, PPE Program)	
<input type="checkbox"/>	<input type="checkbox"/>	PPE is inspected, tested and maintained in serviceable and sanitary condition as recommended by the manufacturer. Is defective or damaged equipment taken out of service and repaired or replaced?	
<input type="checkbox"/>	<input type="checkbox"/>	Are workers trained in the use of the PPE required?	
<input type="checkbox"/>	<input type="checkbox"/>	Are personnel exposed to vehicular or equipment traffic, including signal persons, spotters or inspectors required to vests or apparel marked with a reflective or high visibility material?	
<input type="checkbox"/>	<input type="checkbox"/>	Is there a noise hazard? If yes, hearing protection will be required.	
<input type="checkbox"/>	<input type="checkbox"/>	Is there a splash or splatter hazard? Face shields or goggles will be required.	
<input type="checkbox"/>	<input type="checkbox"/>	Will personnel be working in or over water? Personnel Floatation devices will be required.	
<input type="checkbox"/>	<input type="checkbox"/>	Is there a welding hazard? Welding helmet and leathers will be required. Is there a cutting torch hazard? Goggles and protective clothing will be required.	
<input type="checkbox"/>	<input type="checkbox"/>	Is each person on a walking/working surface with an unprotected side or edge which is 6 feet (1.8 m) or more above a lower level protected from falling by the use of guardrail systems, safety net systems or personal fall arrest systems? See WESTON FLD 25 (Note General Industry standard is four feet).	
<input type="checkbox"/>	<input type="checkbox"/>	Guardrail systems are used as primary protection whenever feasible. Guardrail construction meets criteria in 29 CFR 1926.502(b).	
<input type="checkbox"/>	<input type="checkbox"/>	Personal fall arrest systems (PFAS) are inspected and appropriate for use.	
<input type="checkbox"/>	<input type="checkbox"/>	Ropes and straps (webbing) used in lanyards, lifelines, and strength components of body belts and body harnesses are from synthetic fibers.	
<input type="checkbox"/>	<input type="checkbox"/>	Safety nets and safety net installations are constructed, tested and used according to 29 CFR 1926.502.c	
<input type="checkbox"/>	<input type="checkbox"/>	Is respirator use required? See WESTON Respiratory Protection Program	
<input type="checkbox"/>	<input type="checkbox"/>	Persons using respiratory protection have been successfully medically cleared, trained and fit tested.	
<input type="checkbox"/>	<input type="checkbox"/>	Respirators are used according to the manufacturer's instructions, regulatory requirements, selection criteria and health and safety plan provisions.	
<input type="checkbox"/>	<input type="checkbox"/>	For Level C operations with organic vapor contamination, is the cartridge change-out schedule documented?	
<input type="checkbox"/>	<input type="checkbox"/>	Is breathing certified as Grade D, or better, and certification available on-site?	

# ENVIRONMENTAL HEALTH AND SAFETY INSPECTION CHECKLIST

## MACHINERY AND MECHANIZED EQUIPMENT 29 CFR 1926 Subparts N, O. EM 385-1-1, Sections 16, 17, 18

YES	NO		COMMENT
<input type="checkbox"/>	<input type="checkbox"/>	Are inspections of machinery by a competent person established?	
<input type="checkbox"/>	<input type="checkbox"/>	Is equipment inspected daily before its next use?	
<input type="checkbox"/>	<input type="checkbox"/>	Equipment inspection reports are reviewed, followed-up on negative findings and records of inspections are maintained?	
<input type="checkbox"/>	<input type="checkbox"/>	Machinery or equipment found to be unsafe is taken out of service until the unsafe condition has been corrected.	
<input type="checkbox"/>	<input type="checkbox"/>	Is there a preventive maintenance program established?	
<input type="checkbox"/>	<input type="checkbox"/>	Are operators of equipment qualified and authorized to operate?	
<input type="checkbox"/>	<input type="checkbox"/>	Is all self-propelled construction and industrial equipment equipped with a reverse signal alarm?	
<input type="checkbox"/>	<input type="checkbox"/>	Are seats or equal protection provided for each person required to ride on equipment. Are seatbelts installed and worn on motor vehicles, as appropriate.	
<input type="checkbox"/>	<input type="checkbox"/>	All equipment with windshields is equipped with powered wipers. If fogging or frosting is possible, operable defogging or defrosting devices are required.	
<input type="checkbox"/>	<input type="checkbox"/>	Internal combustion engines are not operated in enclosed areas unless adequate ventilation are made. Air monitoring is conducted to assure safe working conditions.	
<input type="checkbox"/>	<input type="checkbox"/>	Is each bulldozer, scraper, dragline, crane, motor grader, front-end loader, mechanical shovel, backhoe, or similar equipment equipped with at least one dry chemical or carbon dioxide fire extinguisher with a minimum rating of 5-B:C?	
<input type="checkbox"/>	<input type="checkbox"/>	Will cranes or other lifting devices be used? If so, are the following documents available on site: 1) a copy of the operating manual, 2) load rating chart, 3) log book, 4) a copy of the last annual inspection and 5) the initial on-site inspection?	
<input type="checkbox"/>	<input type="checkbox"/>	Do operators have certificates of training to operate the type of crane(s) to be used?	
<input type="checkbox"/>	<input type="checkbox"/>	Is a signal person provided when the point of operation is not in full view of the vehicle, machine or equipment operator? When manual (hand) signals are used, is only one person designated to give signals to the operator?	
<input type="checkbox"/>	<input type="checkbox"/>	Signal persons back one vehicle at a time. While under the control of a signal person, drivers do not back or maneuver until directed. Drivers stop if contact with the signal person is lost.	
<input type="checkbox"/>	<input type="checkbox"/>	Is a critical lift plan prepared by a competent person whenever: a lift is not routine, or a lift exceeds 75% of a crane's capacity, a lift results in the load being out of the operator's line of sight, or a lift involves more than one crane, a man basket is used, or the operator believes there is a need for a critical lift plan.	
<input type="checkbox"/>	<input type="checkbox"/>	Fork Lifts (Powered Industrial Trucks) - Will forklifts be used on site?	
<input type="checkbox"/>	<input type="checkbox"/>	All fork lifts meet the requirements of design, construction, stability, inspection, testing, maintenance and operation as indicated in ANSI/ASME B56.1 Safety Standards for Low Lift and High Lift Trucks.	
<input type="checkbox"/>	<input type="checkbox"/>	Do forklift operators have certificates of training?	
<input type="checkbox"/>	<input type="checkbox"/>	Are pile driving operations conducted according to EM 385-1-1, Section 16.L?	
<input type="checkbox"/>	<input type="checkbox"/>	Is drilling equipment operated, inspected, and maintained as specified in the manufacturer's operating manual? Is a copy of the manual available at the work-site? See also the Drilling Safety Guide in the Safety Officers Field Manual.	
<input type="checkbox"/>	<input type="checkbox"/>	Are flag persons provided when operations or equipment on or near a highway expose workers to traffic hazards? Do flag persons and persons working in proximity to a road wear high visibility vests? Are persons exposed to highway vehicle traffic protected by signs in all directions warning of the presence of the flag persons and the work? Do signs and distances from the work zone conform to federal and local regulations?	

# ENVIRONMENTAL HEALTH AND SAFETY INSPECTION CHECKLIST

## MOTOR VEHICLES 29 CFR 1926 Subpart O. EM 385-1-1, Section 18

YES	NO		COMMENT
<input type="checkbox"/>	<input type="checkbox"/>	Motor vehicle operators have a valid permit, license, or certification of ability for the equipment being operated.	
<input type="checkbox"/>	<input type="checkbox"/>	Inspection, maintenance and repair is according to manufacturer's requirements by qualified persons.	
<input type="checkbox"/>	<input type="checkbox"/>	Vehicles are inspected on a scheduled maintenance program.	
<input type="checkbox"/>	<input type="checkbox"/>	Vehicles not in safe operating condition are removed from service until defects are corrected.	
<input type="checkbox"/>	<input type="checkbox"/>	Glass in windshields, windows, and doors is safety glass. Any cracked or broken glass is replaced.	
<input type="checkbox"/>	<input type="checkbox"/>	Seatbelts are installed and worn.	
<input type="checkbox"/>	<input type="checkbox"/>	The number of passengers in passenger-type vehicles does not exceed the number which can be seated.	
<input type="checkbox"/>	<input type="checkbox"/>	Trucks used to transport personnel have securely anchored seating, a rear endgate, and a guardrail.	
<input type="checkbox"/>	<input type="checkbox"/>	No person is permitted to ride with arms or legs outside of a vehicle body; in a standing position on the body; on running boards; seated on side fenders, cabs, cab shields, rear of the truck or on the load.	
<input type="checkbox"/>	<input type="checkbox"/>	ATV operators possess valid state drivers license, have completed an ATV training course prior to operation of the vehicle, and wear appropriate protective equipment such as helmets, boots, and gloves.	

## EXCAVATING AND TRENCHING 29 CFR 1926 Subpart P. EM 385-1-1, Section 25

YES	NO		COMMENT
<input type="checkbox"/>	<input type="checkbox"/>	Has the known or estimated location of utility installations such as sewer, telephone, fuel, electric, water lines, or any other underground installations that may be expected to be encountered during excavation been determined before excavation? Have utility locations been verified by designated state services according to state regulations? Has the client provided clearance where state jurisdiction doesn't apply?	
<input type="checkbox"/>	<input type="checkbox"/>	Have overhead utilities in excavation areas been identified and either de-energized, shielded or barricaded so excavating equipment will not come within 10 feet?	
<input type="checkbox"/>	<input type="checkbox"/>	Are inspections of the excavation, the adjacent areas, and protective systems made daily and as necessary by a competent person?	
<input type="checkbox"/>	<input type="checkbox"/>	Are Protective systems in place as prescribed by the competent person?	
<input type="checkbox"/>	<input type="checkbox"/>	Is material removed from excavations managed so it will not overwhelm the protective systems?	
<input type="checkbox"/>	<input type="checkbox"/>	Are barriers provided between excavations and walkways?	
<input type="checkbox"/>	<input type="checkbox"/>	Are excavations by roadways barricaded to warn vehicles of presence or to prevent them from falling in?	
<input type="checkbox"/>	<input type="checkbox"/>	Is there a means of exit from the excavation every 25 feet?	
<input type="checkbox"/>	<input type="checkbox"/>	Is air monitoring required? If yes, Is it performed?	

## CONFINED SPACES 29 CFR 1910 Subpart J. EM 385-1-1, Section 6

YES	NO		COMMENT
<input type="checkbox"/>	<input type="checkbox"/>	Is there a Confined Space Entry Program in place?	
<input type="checkbox"/>	<input type="checkbox"/>	Are the confined Spaces identified and labeled?	
<input type="checkbox"/>	<input type="checkbox"/>	Will the Confined Spaces be entered?	
<input type="checkbox"/>	<input type="checkbox"/>	Is appropriate entry documentation used and on-file?	

# ENVIRONMENTAL HEALTH AND SAFETY INSPECTION CHECKLIST

## ELECTRICAL 29 CFR 1926 Subpart K. EM 385-1-1, Section 11

YES	NO		COMMENT
<input type="checkbox"/>	<input type="checkbox"/>	Are electrical installations made according to the National Electrical Code and applicable local codes?	
<input type="checkbox"/>	<input type="checkbox"/>	Qualified electricians make all connections and perform all work within 10 feet of live electric equipment.	
<input type="checkbox"/>	<input type="checkbox"/>	Location of underground, overhead, under floor, behind wall electrical lines is known and communicated. Lines are documented by qualified person as de-energized where necessary.	
<input type="checkbox"/>	<input type="checkbox"/>	Workers understand they must not work near live parts of electric circuits, unless they are qualified as required by OSHA or are protected by de-energizing and grounding the parts, guarding the parts by insulation, or other effective means?	
<input type="checkbox"/>	<input type="checkbox"/>	Employees who regularly work on or around energized electrical equipment or lines are instructed in the cardiopulmonary resuscitation (CPR) methods.	
<input type="checkbox"/>	<input type="checkbox"/>	Workers are prohibited from working alone on energized lines or equipment over 600 volts.	
<input type="checkbox"/>	<input type="checkbox"/>	Are Ground-fault circuit interrupters (GFCI's) or is ground fault circuit protection provided to protect employees from ground-fault hazards for all 115 – 120 Volt, 15 and 20 amp receptacle outlets which are not a part of the permanent wiring of a building or structure at construction sites?	
<input type="checkbox"/>	<input type="checkbox"/>	Circuit breakers are labeled.	
<input type="checkbox"/>	<input type="checkbox"/>	Circuit breaker and all cabinets with exposed electric conductors are kept tightly closed.	
<input type="checkbox"/>	<input type="checkbox"/>	Unused openings (including conduit knockouts) in electrical enclosures and fittings are closed with appropriate covers, plugs or plates.	
<input type="checkbox"/>	<input type="checkbox"/>	Sufficient access and working space is provided and maintained about all electrical equipment to permit ready and safe operations and maintenance.	
<input type="checkbox"/>	<input type="checkbox"/>	Motors are located within sight of their controllers or controller disconnecting means are capable of being locked in the pen position or is a separate disconnecting means installed in the circuit within sight of the motor.	
<input type="checkbox"/>	<input type="checkbox"/>	Are visual inspections of extension cords and cord-and plug-connected equipment conducted daily? Is equipment found damaged or defective tagged and removed from service, and not used until repaired?	
<input type="checkbox"/>	<input type="checkbox"/>	Wet Areas - Is portable lighting used in wet or conductive locations, such as tanks or boilers operated at no more than 12 volts and protected by GFCIs.	
<input type="checkbox"/>	<input type="checkbox"/>	Are electrical installations in hazardous areas to NEC?	
<input type="checkbox"/>	<input type="checkbox"/>	Metal ladders and tools including tape measures or fabric with metal thread are prohibited where contact with energized electrically parts is possible.	
<input type="checkbox"/>	<input type="checkbox"/>	All extension cords are the three-wire type, designed and rated for hard or extra hard usage?	
<input type="checkbox"/>	<input type="checkbox"/>	Worn or frayed electrical cords or cables are taken out of service. Fastening with staples, hanging from nails or suspending extension cords by wire is prohibited.	
<input type="checkbox"/>	<input type="checkbox"/>	Electric wire/flexible cord passing through work areas is protected from damage such as foot traffic, vehicles, sharp corners, projections and pinching? Flexible cords and cables passing through holes are protected by bushings or fittings?	
<input type="checkbox"/>	<input type="checkbox"/>	Before an employee or contractor performs any service or maintenance on a system where the unexpected energizing, start up, or release of kinetic or stored energy could occur and cause injury or damage, the system is to be isolated. Only authorized persons may apply and remove lockouts and tags.	
<input type="checkbox"/>	<input type="checkbox"/>	Contractors planning to use hazardous energy control procedures submit their hazardous energy control plan to the WESTON site safety officer or designee before implementing lockout/tagout procedures.	
<input type="checkbox"/>	<input type="checkbox"/>	There is a site specific hazardous energy control plan that clearly and specifically outlines the scope, purpose, authorization, rules and techniques to be used for the control of hazardous energy.	
<input type="checkbox"/>	<input type="checkbox"/>	Workers possess the knowledge and skills required for the safe application, usage and removal of energy controls.	



# ENVIRONMENTAL HEALTH AND SAFETY INSPECTION CHECKLIST

## WELDING AND CUTTING 29 CFR 1926 Subpart J. EM 385-1-1, Section 10

YES	NO		COMMENT
<input type="checkbox"/>	<input type="checkbox"/>	Prior to performing welding, cutting or any other heat or spark producing activity, an assessment of the area is made by a competent person to identify combustible materials and potential sources of flammable atmospheres.	
<input type="checkbox"/>	<input type="checkbox"/>	Welders, cutters and their supervisors are trained in the safe operation of their equipment, safe welding and cutting practices, hot work permit requirements, and fire protection.	
<input type="checkbox"/>	<input type="checkbox"/>	Welding and cutting equipment is inspected daily before use. Unsafe equipment is taken out of use, replaced or repaired.	
<input type="checkbox"/>	<input type="checkbox"/>	Workers and the public is shielded from welding rays, flashes, sparks, molten metal and slag.	
<input type="checkbox"/>	<input type="checkbox"/>	Employees performing welding, cutting or heating are protected by PPE appropriate for the hazards (e.g., respiratory, vision and skin protection).	
<input type="checkbox"/>	<input type="checkbox"/>	Compatible fire extinguishing equipment is provided in the immediate vicinity of welding or cutting operations.	
<input type="checkbox"/>	<input type="checkbox"/>	Drums, tanks, or other containers and equipment which have contained hazardous materials shall be thoroughly cleaned before welding or cutting. Cleaning shall be performed in accordance with NFPA 327, <u>Cleaning or Safeguarding Small Tanks and Containers</u> , ANSI/AWS F4.1, <u>Recommended Safe Practices for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances</u> , and applicable health and safety plan requirements.	

## HAND AND POWER TOOL SAFETY 29 CFR 1926 Subpart I. EM 385-1-1, Section 13

YES	NO		COMMENT
<input type="checkbox"/>	<input type="checkbox"/>	Power tools are from a manufacturer listed by a nationally recognized testing laboratory for the specific application for which they are to be used.	
<input type="checkbox"/>	<input type="checkbox"/>	Hand & power tools are inspected, maintained, tested and determined to be in safe operating condition before use.	
<input type="checkbox"/>	<input type="checkbox"/>	Tools found to be unsafe are not used, tagged and repaired or destroyed.	
<input type="checkbox"/>	<input type="checkbox"/>	Users of tools are trained in safe use.	
<input type="checkbox"/>	<input type="checkbox"/>	Electrical tools have cords and plug connections in good repair.	
<input type="checkbox"/>	<input type="checkbox"/>	Electrical tools are effectively grounded or approved double insulated.	
<input type="checkbox"/>	<input type="checkbox"/>	Reciprocating, rotating, and moving parts of equipment are guarded if they may be accessed by employees or they otherwise create a hazard.	
<input type="checkbox"/>	<input type="checkbox"/>	Safety clips/retainers are installed and maintained on pneumatic impact tool connections.	
<input type="checkbox"/>	<input type="checkbox"/>	Chain saws have an automatic chain brake or anti-kickback device.	
<input type="checkbox"/>	<input type="checkbox"/>	Pneumatic and hydraulic hoses and fittings are inspected regularly.	
<input type="checkbox"/>	<input type="checkbox"/>	Employees who operate powder actuated tools are trained and carry valid operators cards.	
<input type="checkbox"/>	<input type="checkbox"/>	Powder activated tools are stored in individual locked containers, when not in use and are not loaded until ready to use.	
<input type="checkbox"/>	<input type="checkbox"/>	Powder actuated tools are inspected for obstructions or defects daily before use.	
<input type="checkbox"/>	<input type="checkbox"/>	Powder actuated tool operators have appropriate PPE.	

# ENVIRONMENTAL HEALTH AND SAFETY INSPECTION CHECKLIST

## RIGGING 29 CFR 1926 Subpart H. EM 385-1-1, Section 15

YES	NO		COMMENT
<input type="checkbox"/>	<input type="checkbox"/>	Rigging equipment is inspected as specified by the manufacturer, by a qualified person, before use on each shift and as necessary to assure that it is safe.	
<input type="checkbox"/>	<input type="checkbox"/>	Defective equipment is removed from service.	
<input type="checkbox"/>	<input type="checkbox"/>	Rigging not in use is removed from the work area, properly stored, and maintained in good condition.	
<input type="checkbox"/>	<input type="checkbox"/>	Wire rope removed from service for defects is cut up or plainly marked as unfit for use as rigging.	
<input type="checkbox"/>	<input type="checkbox"/>	The number of saddle clips used to form eyes in wire rope conforms with Table H-20, are spaced evenly and the saddles are on the live side.	
<input type="checkbox"/>	<input type="checkbox"/>	Chain rigging has a tag clearly indicating load limits, is inspected before initial use, then weekly, and is of alloyed metal.	
<input type="checkbox"/>	<input type="checkbox"/>	Fiber rope rigging is not used if it is frozen or has been subject to acids or excessive heat.	
<input type="checkbox"/>	<input type="checkbox"/>	Slings and their fittings and fastenings are inspected before use on each shift and as needed during use.	
<input type="checkbox"/>	<input type="checkbox"/>	Drums, sheaves, and pulleys on rigging hardware are smooth and free of surface defects that can damage rigging.	

## MATERIAL HANDLING, STORAGE, AND DISPOSAL 29 CFR 1926 Subpart H. EM 385-1-1, Section 14

YES	NO		COMMENT
<input type="checkbox"/>	<input type="checkbox"/>	Employees are trained in and use safe lifting techniques.	
<input type="checkbox"/>	<input type="checkbox"/>	Materials are not moved or suspended over workers unless positive precautions have been taken to protect workers.	
<input type="checkbox"/>	<input type="checkbox"/>	Conveyors are constructed, inspected, & maintained by qualified persons according to manufacturer's recommendations.	
<input type="checkbox"/>	<input type="checkbox"/>	All conveyors are to be equipped with emergency stopping devices.	
<input type="checkbox"/>	<input type="checkbox"/>	Hazardous exposed moving machine parts are guarded mechanically, electrically or by location.	
<input type="checkbox"/>	<input type="checkbox"/>	Controls are clearly marked and/or labeled to indicate the function controlled.	
<input type="checkbox"/>	<input type="checkbox"/>	Taglines are used for suspended loads where the movement may be hazardous to persons.	
<input type="checkbox"/>	<input type="checkbox"/>	Material in storage is protected from falling or collapse by effective stacking, blocking, cribbing, etc.	
<input type="checkbox"/>	<input type="checkbox"/>	Walkways and aisles are to be kept clear.	
<input type="checkbox"/>	<input type="checkbox"/>	Materials are not stored on scaffolds or runways in excess of normal placement or in excess of safe load limits.	
<input type="checkbox"/>	<input type="checkbox"/>	Work areas and means of access are maintained safe and orderly.	
<input type="checkbox"/>	<input type="checkbox"/>	Tools, materials, extension cords, hoses or debris do not cause tripping or other hazards.	
<input type="checkbox"/>	<input type="checkbox"/>	Storage and construction sites are kept free from the accumulation of combustible materials.	
<input type="checkbox"/>	<input type="checkbox"/>	Waste materials and rubbish are placed in containers or, if appropriate, in piles. Waste materials are disposed of in accord with applicable local, state, or federal requirements.	

# ENVIRONMENTAL HEALTH AND SAFETY INSPECTION CHECKLIST

## FLOATING PLANT AND MARINE ACTIVITIES 29 CFR 1926 Subpart O. EM 385-1-1 Section 19

YES	NO		COMMENT
<input type="checkbox"/>	<input type="checkbox"/>	Floating plants that are regulated by the USCG have current inspections and certificates.	
<input type="checkbox"/>	<input type="checkbox"/>	Before any floating plant is brought to the job site and placed in service it is inspected and determined to be in safe operating condition	
<input type="checkbox"/>	<input type="checkbox"/>	Periodic inspections are made such that safe operating conditions are maintained. Strict compliance with EM 385-1-1, Section 19 is expected.	
<input type="checkbox"/>	<input type="checkbox"/>	Plans are in place for removing or securing the plant and evacuation of personnel endangered by severe weather and other marine emergencies such as; fire, flooding, man overboard, hazardous materials incidents, etc..	
<input type="checkbox"/>	<input type="checkbox"/>	Means of access are properly secured, guarded, and maintained free of slipping and tripping hazards.	
<input type="checkbox"/>	<input type="checkbox"/>	Dredging operations follow guidelines as established in EM 385-1-1, Section 19.D.	

## PRESSURIZED EQUIPMENT AND SYSTEMS 29 CFR 1926 Subparts I, F. EM 385-1-1, Section 20

YES	NO		COMMENT
<input type="checkbox"/>	<input type="checkbox"/>	Pressurized equipment and systems are inspected before being placed into service.	
<input type="checkbox"/>	<input type="checkbox"/>	Pressurized equipment or systems found to be unsafe are tagged "Out of Service-Do Not Use".	
<input type="checkbox"/>	<input type="checkbox"/>	Systems and equipment are operated, inspected and maintained by qualified, designated personnel.	
<input type="checkbox"/>	<input type="checkbox"/>	Safe clearance, lockout/tagout procedures are followed as appropriate during maintenance or repair.	
<input type="checkbox"/>	<input type="checkbox"/>	Air hose, pipes, fittings are pressure-rated for the activity. Defective hoses are removed from service.	
<input type="checkbox"/>	<input type="checkbox"/>	Hoses aren't laid over ladders, steps, scaffolds, or walkways in a manner that creates a tripping hazard.	
<input type="checkbox"/>	<input type="checkbox"/>	The use of compressed air for personal cleaning is prohibited. The use of compressed air for other cleaning is restricted to less than 30 psig.	
<input type="checkbox"/>	<input type="checkbox"/>	Compressed gas cylinders are stored in well-ventilated locations.	
<input type="checkbox"/>	<input type="checkbox"/>	Cylinders in storage are separated from flammable or combustible liquids and from easily ignitable materials by at least 40 feet or by a minimum five feet tall, ½ -hour fire resistive partition.	
<input type="checkbox"/>	<input type="checkbox"/>	Stored cylinders containing oxidizing gases are separated from fuel gas cylinders by at least 20 feet or by a minimum five feet tall, ½ -hour fire resistive partition.	
<input type="checkbox"/>	<input type="checkbox"/>	Cylinder valve caps are in place when cylinders are in storage, in transit, or a regulator is not in place.	
<input type="checkbox"/>	<input type="checkbox"/>	Compressed gas cylinders in service are secured in substantial fixed or portable racks or hand trucks.	
<input type="checkbox"/>	<input type="checkbox"/>	Oxygen cylinders and fittings are kept away from, and free from oil and grease.	
<input type="checkbox"/>	<input type="checkbox"/>	Cylinder Storage areas are posted with the names of the gases in storage and with signs indicating "No Smoking or Open Flame".	
<input type="checkbox"/>	<input type="checkbox"/>	Cylinders are to be stored such that mechanical and corrosion damage is avoided. Cylinders are not to be stored in areas required as an egress path.	
<input type="checkbox"/>	<input type="checkbox"/>	Cylinders may be stored in the open outdoors, however, they must be protected from the ground to prevent corrosion and must be protected from temperatures that may exceed 125 degrees F.	

# ENVIRONMENTAL HEALTH AND SAFETY INSPECTION CHECKLIST

## WORK PLATFORMS/SCAFFOLDS 29 CFR 1926 Subparts L, M, N. EM 385-1-1 Sections 21, 22

YES	NO		COMMENT
<input type="checkbox"/>	<input type="checkbox"/>	Work platforms are erected, used, inspected, tested, maintained and repaired according to manufacturer's requirements.	
<input type="checkbox"/>	<input type="checkbox"/>	Construction, inspection, and disassembly of scaffolds is under the direction of a competent person.	
<input type="checkbox"/>	<input type="checkbox"/>	Workers on scaffolding have been trained by a qualified person.	
<input type="checkbox"/>	<input type="checkbox"/>	Scaffolds are erected on a firm and level surface and are square and plumb.	
<input type="checkbox"/>	<input type="checkbox"/>	Scaffolds are not loaded in excess of rated capacity.	
<input type="checkbox"/>	<input type="checkbox"/>	Working levels of work platforms are fully planked or decked.	
<input type="checkbox"/>	<input type="checkbox"/>	Planks are in good condition and free from obvious defects.	
<input type="checkbox"/>	<input type="checkbox"/>	Fabricated frame scaffolding four times higher than the base width is secured to building/structure according to manufacturer's instruction and/or OSHA requirements.	
<input type="checkbox"/>	<input type="checkbox"/>	Working platforms of scaffolding over ten feet in height have guard rails meeting OSHA specifications. Fall protection is suggested at four feet or greater.	
<input type="checkbox"/>	<input type="checkbox"/>	Scaffolding/work platforms are accessed by means of a properly secured ladder or equivalent. Built on ladders conform to scaffold ladder requirements. Climbing of braces is not allowed.	
<input type="checkbox"/>	<input type="checkbox"/>	Crane supported work platforms are designed and used in accordance with OSHA standards.	
<input type="checkbox"/>	<input type="checkbox"/>	Elevating work platforms are operated, inspected and maintained according to the equipment operations manual.	
<input type="checkbox"/>	<input type="checkbox"/>	Employees working in aerial lifts remain firmly on the floor of the basket. Employees use fall protection while in an aerial lift basket.	

## WALKING AND WORKING SURFACES AND STAIRS 29 CFR 1926 Subparts L, M, X. EM 385-1-1, Sections 21, 22, 24

YES	NO		COMMENT
<input type="checkbox"/>	<input type="checkbox"/>	Work areas are clean, sanitary, and orderly	
<input type="checkbox"/>	<input type="checkbox"/>	Work surfaces are kept dry or appropriate means are taken to assure the surfaces are slip-resistant	
<input type="checkbox"/>	<input type="checkbox"/>	Accumulations of combustible dust are routinely removed.	
<input type="checkbox"/>	<input type="checkbox"/>	Aisles and passageways are kept clear and marked as appropriate.	
<input type="checkbox"/>	<input type="checkbox"/>	There is safe clearance for walking in aisles where motorized or mechanical handling equipment is operating.	
<input type="checkbox"/>	<input type="checkbox"/>	Materials or equipment is stored in such a way that sharp projections will not interfere with the walkway.	
<input type="checkbox"/>	<input type="checkbox"/>	Changes of direction or elevation are readily identifiable.	
<input type="checkbox"/>	<input type="checkbox"/>	Aisles or walkways that pass near moving or operating machinery, welding operations or similar operations are arranged so employees will not be subjected to potential hazards.	
<input type="checkbox"/>	<input type="checkbox"/>	Standard guardrails are provided wherever aisle or walkway surfaces are elevated more than 30 inches above any adjacent floor or the ground and bridges provided where workers must cross over conveyors and similar hazards.	
<input type="checkbox"/>	<input type="checkbox"/>	There are standard stair rails or handrails on all stairways having four or more risers or with an elevation of 30 or more inches.	
<input type="checkbox"/>	<input type="checkbox"/>	Stairways are at least 22 inches wide. (General Industry Standard)	
<input type="checkbox"/>	<input type="checkbox"/>	Stairs angle no more than 50 and no less than 30 degrees, risers are uniform from top to bottom (plus or minus 1/4 inch) and are provided with a surface that renders them slip resistant.	
<input type="checkbox"/>	<input type="checkbox"/>	Stairway handrails are not less than 36 inches above the leading edge of stair treads and have at least 3 inches of clearance	

## ENVIRONMENTAL HEALTH AND SAFETY INSPECTION CHECKLIST

		between the handrails and the wall or surface they are mounted on.	
<input type="checkbox"/>	<input type="checkbox"/>	Where doors or gates open directly on a stairway, there is a platform provided so the swing of the door does not reduce the width of the platform to less than 20 inches.	
<input type="checkbox"/>	<input type="checkbox"/>	Where stairs or stairways exit directly into any area where vehicles may be operated, there are adequate barriers and warnings provided to prevent employees stepping into the path of traffic.	
<input type="checkbox"/>	<input type="checkbox"/>	Signs are posted showing the load capacity of elevated storage areas.	
<input type="checkbox"/>	<input type="checkbox"/>	An appropriate means of access and egress is provided for surfaces with 19 or more inches of elevation change.	
		Material on elevated surfaces is minimized, with that necessary for immediate work requirements piled, stacked or racked in a manner to prevent it from tipping, falling, collapsing, rolling or spreading.	

### FLOOR AND WALL HOLES AND OPENINGS 29 CFR 1926 Subpart M. EM 385-1-1, Section 24

YES	NO		COMMENT
<input type="checkbox"/>	<input type="checkbox"/>	Floor and roof openings that persons can walk into or fall through are guarded by a physical barrier or covered.	
<input type="checkbox"/>	<input type="checkbox"/>	Holes (defined as equal to or greater than 2 inches in least dimension) where person could trip must be covered/protected.	
<input type="checkbox"/>	<input type="checkbox"/>	Unprotected sides and edges on a walking/working surface six feet or more (note four feet in General Industry) are protected by guardrail system, safety net or Personal Fall Arrest System (PFAS).	
<input type="checkbox"/>	<input type="checkbox"/>	Unused portions of service pits and pits not actually in use are either covered or protected by guardrails or equivalent.	
<input type="checkbox"/>	<input type="checkbox"/>	Coverings for holes or other openings must be constructed of sufficient strength to support any anticipated load, must be secured in place to prevent accidental removal or displacement and must be marked indicating purpose (e.g., stenciled "Hole" or painted contrasting color to surroundings).	

# ENVIRONMENTAL HEALTH AND SAFETY INSPECTION CHECKLIST

## LADDERS

### 29 CFR 1926 Subpart X. EM 385-1-1, Section 21

YES	NO		COMMENT
<input type="checkbox"/>	<input type="checkbox"/>	Portable ladders are used for their designed purpose only.	
<input type="checkbox"/>	<input type="checkbox"/>	Portable ladders are examined for defects prior to, and after use.	
<input type="checkbox"/>	<input type="checkbox"/>	Ladders found to be defective are clearly tagged to indicate "DO NOT USE" if repairable, or destroyed immediately if no repair is possible.	
<input type="checkbox"/>	<input type="checkbox"/>	Workers are trained in hazards associated with ladder use and how to inspect ladders.	
<input type="checkbox"/>	<input type="checkbox"/>	Ladders have secure footing provided by a combination of safety feet, top of ladder tie-offs and mud cills or a person holding the ladder to prevent slipping.	
<input type="checkbox"/>	<input type="checkbox"/>	The handrails of a straight ladder used to get from one level to another extend at least 36 inches above the landing.	
<input type="checkbox"/>	<input type="checkbox"/>	Ladders conform to construction criteria of ANSI Standards A-14.1 and A-14.2.	
<input type="checkbox"/>	<input type="checkbox"/>	Wooden ladders are not painted with an opaque covering such that signs of flaws, cracks or drying are obscured.	
<input type="checkbox"/>	<input type="checkbox"/>	Fixed ladders are constructed and used according to OSHA Standards, 29 CFR 1910.27 and ANSI A-14.3.	
<input type="checkbox"/>	<input type="checkbox"/>	Rungs, cleats or steps, and side rails that may be used for handholds when climbing, offer adequate gripping surface and are free of splinters, splinters or burrs, and substances that could cause slipping.	
<input type="checkbox"/>	<input type="checkbox"/>	Fixed ladders of greater than 24 feet have cages or other approved fall protection devices. (note General Industry is 20 feet).	
<input type="checkbox"/>	<input type="checkbox"/>	Where fall protection is provided by ladder safety systems (body belts or harnesses, lanyards and braking devices with safety lines or rails), systems meet the requirements of and are used in accordance with WESTON Fall Protection Standard Practices and are compatible with construction of the ladder system.	

## DEMOLITION

### 29 CFR 1926 Subpart T. EM 385-1-1, Section 23

YES	NO		COMMENT
<input type="checkbox"/>	<input type="checkbox"/>	Prior to initiating demolition activities an engineering survey (by a competent person) and a demolition plan (by a competent person) is completed.	
<input type="checkbox"/>	<input type="checkbox"/>	All employees engaged in demolition activities are instructed in the demolition plan.	
<input type="checkbox"/>	<input type="checkbox"/>	It has been determined through the engineering survey and outlined in the plan, if any hazardous materials, or conditions (e.g., asbestos, lead, utility connections, etc.) exist. Such hazards are controlled or eliminated before demolition is started.	
<input type="checkbox"/>	<input type="checkbox"/>	Continued inspections, by a competent person, are conducted to ensure safe employee working conditions.	

## TREE MAINTENANCE AND REMOVAL

### 29 CFR 1910 Subpart R. EM 385-1-1, Section 31

YES	NO		COMMENT
<input type="checkbox"/>	<input type="checkbox"/>	Tree maintenance or removal is done under the direction of a qualified person.	
<input type="checkbox"/>	<input type="checkbox"/>	Tree work, in the vicinity of charged electric lines, is by trained persons qualified to work with electricity and tree work. Appropriate distances are maintained for all workers who are not qualified.	
<input type="checkbox"/>	<input type="checkbox"/>	Equipment is inspected, maintained, repaired and used in accordance with the manufacture's directions.	
<input type="checkbox"/>	<input type="checkbox"/>	Prior to felling actions are planned to include clearing of the area to permit safe working conditions and escape.	
<input type="checkbox"/>	<input type="checkbox"/>	Employees must be trained in the safe operation of all equipment.	
<input type="checkbox"/>	<input type="checkbox"/>	All equipment and machinery is inspected and determined safe prior to use.	
<input type="checkbox"/>	<input type="checkbox"/>	Work is performed under requirements of FLD 43.	

# ENVIRONMENTAL HEALTH AND SAFETY INSPECTION CHECKLIST

## BLASTING

### 29 CFR 1926 Subpart U. EM 385-1-1, Section 29

YES	NO		COMMENT
<input type="checkbox"/>	<input type="checkbox"/>	A blasting safety plan is developed prior to bringing explosives on-site.	
<input type="checkbox"/>	<input type="checkbox"/>	The transportation, handling, storage, and use of explosives, blasting agents, and blasting equipment must be directed and supervised by a person with proven experience and ability in blasting operations. Licensing of person is verified.	
<input type="checkbox"/>	<input type="checkbox"/>	Blasting operations in or adjacent to cofferdams, piers, underwater structures, buildings, structures, or other facilities must be carefully planned with full consideration to potential vibration and damage.	

## HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE AND UNDERGROUND STORAGE TANK (UST) ACTIVITIES

### 29 CFR 1926 Subpart D. EM 385-1-1, Section 28

YES	NO		COMMENT
<input type="checkbox"/>	<input type="checkbox"/>	All construction activities performed with known or potential exposure to hazardous waste are conducted in accordance with Hazardous Waste Operations and Emergency Response requirements.	

## CONCRETE and MASONRY CONSTRUCTION

### 29 CFR 1926 Subpart Q. EM 385-1-1, Section 27

YES	NO		COMMENT
<input type="checkbox"/>	<input type="checkbox"/>	Construction loads are not placed on a concrete or masonry structure or portion of a concrete or masonry structure unless the employer determines, based on information from a person who is qualified in structural design, that the structure or portion of the structure is capable of supporting the loads.	
<input type="checkbox"/>	<input type="checkbox"/>	Employees are not permitted to work above or in positions exposed to protruding reinforcing steel or other impalement hazards unless provisions have been made to control the hazard.	
<input type="checkbox"/>	<input type="checkbox"/>	Sections of concrete conveyances and airlines under pressure are secured with wire rope (or equivalent material) in addition to the regular couplings or connections.	
<input type="checkbox"/>	<input type="checkbox"/>	Structural and reinforcing steel for walls, piers, columns, and similar vertical structures is supported and/or guyed to prevent overturning or collapse	
<input type="checkbox"/>	<input type="checkbox"/>	All form-work, shoring, and bracing is designed, fabricated, erected, supported, braced, and maintained so it will safely support all vertical and lateral loads that may be applied until the loads can be supported by the structure.	
<input type="checkbox"/>	<input type="checkbox"/>	Shoring equipment is inspected prior to erection to determine that it is specified in the shoring design. Any equipment found to be damaged is not used.	
<input type="checkbox"/>	<input type="checkbox"/>	Erected shoring equipment is inspected immediately prior to, during, and immediately after the placement of concrete. Any shoring equipment that is found to be damaged, displaced, or weakened is immediately reinforced or re-shored.	
<input type="checkbox"/>	<input type="checkbox"/>	Shoring, vertical slip forms and jacks conform with requirements of Section 27.B.08-13 of USACE EM 385-1-1.	
<input type="checkbox"/>	<input type="checkbox"/>	Forms and shores (except those on slab or grade and slip forms) are not removed until the individual responsible for forming and/or shoring determines that the concrete has gained sufficient strength to support its weight and all superimposed loads.	
<input type="checkbox"/>	<input type="checkbox"/>	Precast concrete members are adequately supported to prevent overturning or collapse until permanent connections are complete	
<input type="checkbox"/>	<input type="checkbox"/>	No one is permitted under pre-cast concrete members being lifted or tilted into position except employees required for the erection of those members.	
<input type="checkbox"/>	<input type="checkbox"/>	Lift slab operations are planned and designed by a registered engineer or architect.	
<input type="checkbox"/>	<input type="checkbox"/>	Hydraulic jacks used in lift slab construction have a safety device that causes the jacks to support the load in any position if the jack malfunctions	
<input type="checkbox"/>	<input type="checkbox"/>	No one is permitted under the slab during jacking operations.	
<input type="checkbox"/>	<input type="checkbox"/>	A limited access zone is established whenever a masonry wall is being constructed.	
<input type="checkbox"/>	<input type="checkbox"/>	Fall protection is provided to masonry workers exposed to falls of 6 feet or more.	

# ENVIRONMENTAL HEALTH AND SAFETY INSPECTION CHECKLIST

## STEEL ERECTION 29 CFR 1926 Subpart R. EM 385-1-1, Section 27

YES	NO		COMMENT
<input type="checkbox"/>	<input type="checkbox"/>	Impact wrenches have a locking device for retaining the socket. Containers shall be provided for storing or carrying rivets, bolts, and drift pins, and secured against accidental displacement when aloft.	
<input type="checkbox"/>	<input type="checkbox"/>	Structural and reinforcing steel for walls, piers, columns, and similar vertical structures shall be guyed and supported to prevent collapse	
<input type="checkbox"/>	<input type="checkbox"/>	No loading is placed upon steel joists until all bridging is completely and permanently installed.	
<input type="checkbox"/>	<input type="checkbox"/>	Workers are provided fall protection whenever they are exposed to falls of 1.8 m (6 ft) or more (EM 385-1-1).	
<input type="checkbox"/>	<input type="checkbox"/>	Temporary flooring in skeleton steel erection conforms with Section 27.F of USACE 385-1-1	

## ROOFING 29 CFR 1926 Subpart M. EM 385-1-1, Sections 21, 22, 24, 27

Yes	No		Comments
<input type="checkbox"/>	<input type="checkbox"/>	In the construction, maintenance, repair, and demolition, of roofs, fall protection systems is provided that will prevent personnel from slipping and falling from the roof and prevent personnel on lower levels from being struck by falling objects	
<input type="checkbox"/>	<input type="checkbox"/>	On all roofs greater than 4.8 m (16 ft) in height, a hoisting device, stairways, or progressive platforms are furnished for supplying materials and equipment.	
<input type="checkbox"/>	<input type="checkbox"/>	Roofing materials and accessories that could be moved by the wind, including metal roofing panels, that are on the roof and unattached are secured when wind speeds are greater than, or are anticipated to exceed, 10 mph.	
<input type="checkbox"/>	<input type="checkbox"/>	Level, guarded platforms are provided at the landing area on the roof.	
<input type="checkbox"/>	<input type="checkbox"/>	When their use is permitted, warning line systems comply with USACE Section 27.07 of EM 385-1-1.	
<input type="checkbox"/>	<input type="checkbox"/>	Workers involved in roof-edge materials handling or working in a storage area located on a roof with a slope $\neq$ to four vertical to twelve horizontal and with edges 6 ft or more above lower levels are protected by the use of a guardrail, safety net, or personal fall arrest system along all unprotected roof sides and edges of the area.	



# ENVIRONMENTAL HEALTH AND SAFETY INSPECTION CHECKLIST

## ENVIRONMENTAL COMPLIANCE

Yes	No		Comments
<input type="checkbox"/>	<input type="checkbox"/>	Environmental Compliance and Waste Management Plan on file.	
<input type="checkbox"/>	<input type="checkbox"/>	Waste Determination Made.	
<input type="checkbox"/>	<input type="checkbox"/>	Manifest and/or Shipping Papers prepared and filed.	
<input type="checkbox"/>	<input type="checkbox"/>	Manifest Exception Reports Prepared, as necessary. Procedures to track manifests in place.	
<input type="checkbox"/>	<input type="checkbox"/>	State Annual and EPA Biennial Reporting Information Available.	
<input type="checkbox"/>	<input type="checkbox"/>	RCRA Personnel Training Records on file.	
<input type="checkbox"/>	<input type="checkbox"/>	CAA Permits on file.	
<input type="checkbox"/>	<input type="checkbox"/>	CWA Permits on file.	
<input type="checkbox"/>	<input type="checkbox"/>	RCRA Permits on file.	
<input type="checkbox"/>	<input type="checkbox"/>	State and/or Local Permits on file.	
<input type="checkbox"/>	<input type="checkbox"/>	RCRA Inspections conducted and Documentation on file.	
<input type="checkbox"/>	<input type="checkbox"/>	Transporter and TSD compliance information on file.	
<input type="checkbox"/>	<input type="checkbox"/>	Waste Accumulation Areas Managed Properly.	
<input type="checkbox"/>	<input type="checkbox"/>	Wetlands Areas Identified and Protected.	
<input type="checkbox"/>	<input type="checkbox"/>	Endangered, Threatened or Special Concern Species or Areas Identified and Protective Methods Determined.	
<input type="checkbox"/>	<input type="checkbox"/>	Runon and Runoff Concerns Identified and Managed.	
<input type="checkbox"/>	<input type="checkbox"/>	Adjacent Land Areas Protected as Necessary.	
<input type="checkbox"/>	<input type="checkbox"/>	Non-Hazardous Solid Wastes Managed Properly.	

## MISCELLANEOUS REGULATORY and POLICY COMPLIANCE

Yes	No		Comments
<input type="checkbox"/>	<input type="checkbox"/>	Personnel Training Records for DOT Materials Handling on file.	
<input type="checkbox"/>	<input type="checkbox"/>	Noise Control Issues Addressed and Managed.	
<input type="checkbox"/>	<input type="checkbox"/>	Site Security Issues Identified and Managed.	
<input type="checkbox"/>	<input type="checkbox"/>	Known Historical, Archeological and Cultural Resources Identified and Managed.	
<input type="checkbox"/>	<input type="checkbox"/>	WESTON EHS Analysis Checklist In Use.	
<input type="checkbox"/>	<input type="checkbox"/>	Safety Observation and Recognition Program in place.	
<input type="checkbox"/>	<input type="checkbox"/>	Weekly EHS Report Card System in place.	
<input type="checkbox"/>	<input type="checkbox"/>	Federal, State and Local Required Postings in place.	
<input type="checkbox"/>	<input type="checkbox"/>	Site specific Lockout/Tagout Program is in place.	
<input type="checkbox"/>	<input type="checkbox"/>	Site-specific Confined Space Program is in place.	
<input type="checkbox"/>	<input type="checkbox"/>	Site Safety Officer filing system is in place and up to date.	

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**ATTACHMENT K**  
**ENVIRONMENTAL PROTECTION AND SUSTAINABILITY PROGRAM**  
**IMPACT CHECKLIST**

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# ENVIRONMENTAL PROTECTION AND SUSTAINABILITY PROGRAM IMPACT CHECKLIST

## PRE-PROPOSAL and EHS COMPLIANCE PLANNING

### 1. BACKGROUND

- a. Client name, address, phone number, and Point of Contact:
- b. Name/Identifier of proposal, if applicable:
- c. Prepared by:

### 2. DESCRIPTION

- a. Description, justification for, and location of Scope of Work in the proposal (i.e. training, activity, construction, regulation, license; include site location map):
- b. Environmental setting and present land use of the proposed site:

### 3. KNOWN OR POTENTIAL EHS IMPACTS:

Note that this checklist cannot completely anticipate all regulatory requirements, and that use of this checklist outlines only certain Federal criteria of specific interest (it is by no means a complete listing). State and local requirements must be evaluated also.

- The **Project Manager and Project Team** are responsible for evaluating project-specific environmental, health and safety needs that may be beyond those outlined in this checklist.
- Assistance is available through the Division Environmental, Health, and Safety (EHS) Managers and Corporate EHS Department. Early engagement of EHS support is a key to success.
- “**Yes**” responses will require a plan to address a specific issue. “**No**” responses must be based upon specific knowledge. “**Unknown**” responses require appropriate follow-up for confirmation.

#### 3.1 Clean Air Act (CAA)

The basic purpose of the CAA is to control air pollution by instituting point source controls (fixed and/or mobile) and establishing maximum pollutant levels for the ambient air. Permits to construct and/or operate are required for sources that meet regulatory requirements. These sources include, but may not be limited to: major stationary sources, hazardous air pollution sources, and sources subject to new source performance standards.

Yes	No	Unknown	Criteria for Evaluation
<b>General and Miscellaneous</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project release contaminants to the air from a new or existing source of air contaminants?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Does the project have the potential for deterioration of air quality?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will there be the introduction of smoke, suspended particles, or noxious gases/vapors (e.g., open burning, open detonation, etc.)?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will there be real or potential for particulate/dust migration beyond facility/site boundaries?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will WESTON own or operate a source of air emissions (e.g., air stripper, incinerator, thermal desorption system, soil vapor extraction system, fuel tanks or dispensers, electric generators, turbines) or disturb land?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will WESTON own or operate an air pollution control device (e.g., scrubber, vapor-phase activated carbon system)?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is fugitive emissions and/or perimeter air monitoring specified in the scope of work?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Has client specified air monitoring methods or real-time monitoring?
<b>Prevention of Significant Deterioration (PSD) Permits (40 CFR 52)</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is site within an attainment area? (See 40 CFR 81.301-356).
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project involve construction or operation of a new major source with the potential to emit more than 100 tons/year for those specific listed emissions sources or 250 tons/year for all other emission sources types or a major modification of an existing major source with pollutant emission increases exceeding Prevention of Significant Deterioration (PSD) rates? (see 40 CFR 52.21(b) and/or CAA Section 169).
<b>Non-Attainment Permits (40 CFR 52)</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is site within a non-attainment area? (See 40 CFR 81.301-356). If known, indicate which criteria pollutant(s) are not met.
<b>New Source Performance Standards (40 CFR 60)</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project involve the release of contaminants to the air from a new or modified non-exempt source?
<b>NESHAPS Standards for Air Toxics (40 CFR 61, 63) See also TSCA and OSHA</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project involve the demolition or renovation of any structure containing asbestos?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project involve a stationary source or group of stationary sources with the potential to emit 10 or more tons/year of a single HAP, or 25 tpy or more of multiple HAPs?
<b>Accidental Release and Risk Management Planning (40 CFR 68)</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project involve storage and/or use of any chemical listed under 40 CFR 68.115 at or greater than its Threshold Planning Quantity (TPQ)?
<b>Operating Permits (40 CFR 70, 71)</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project involve obtaining any permit as required under the CAA?
<b>Reduction in Use of Ozone Depleting Substances (40 CFR 82)</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will site tasks involve repair, maintenance or decommissioning of objects containing ozone depleting substances (e.g., air conditioning/heat pump/refrigeration systems)?

## State-Specific Requirements

As with many environmental regulations, States may have specific and/or additional regulations and laws associated with air and air quality. Remember to evaluate State and/or Local requirements.

### 3.2 Clean Water Act

The stated objective of the Act is to restore and maintain the chemical, physical, and biological integrity of the Nation's water by regulating discharges of pollutants into water bodies. Major requirements to plan for include; point source discharges, stormwater discharges, pretreatment prior to sewer system discharge, spill prevention and response, and wetland modification and/or dredge and fill activities.

Yes	No	Unknown	Criteria for Evaluation
<b>General and Miscellaneous</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project location involve fresh water, marine environment, ground water impact or other?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project involve impact to water movement (e.g., construction of dam)?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project involve any change in the quantity and/or quality of ground water?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is there any potential for spills of hazardous materials/substances/wastes that could subsequently impact water quality (surface or ground)?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project involve any impact to wetlands or floodplains?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is the project in a well head protection area?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will there be any injection of waste materials into the ground?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will unimproved roads or new haul roads be required?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project involve the disruption, displacement or compaction of soil?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project involve a change in topography at the site?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project create an increase in wind or water erosion of soils (either on or off-site)?
<b>NPDES Point Source Discharge Permit (40 CFR 122)</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project involve a point source discharge into surface water?
<b>Stormwater Discharge Permit (40 CFR 122.26)</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project involve an industrial facility with potential for stormwater discharges to surface water or to a storm sewer system?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project involve the disturbance of one or more acres of land?
<b>Pretreatment Requirements (40 CFR 403)</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will there be a discharge (e.g., process water, groundwater, cooling water) to a sewer authority or public sewer system? (Do not include proper connections from domestic-type sources such as toilets or kitchens).
<b>Discharge of Oil and SPCC Plans (40 CFR 110, 112)</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will oil or petroleum products be stored at the site/operation?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the storage capacity of oil or petroleum products exceed 1320 gallons in above ground storage (include only containers equal to or larger than 55 gallons), or 42000 gallons underground?
<b>Wetlands Modification and/or Dredge and Fill Requirements (40 CFR 230-233)</b>			

Yes	No	Unknown	Criteria for Evaluation
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project involve excavation in or the discharge or dredge or fill material into water or wetlands?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project involve site clearing, or dredging or filling on/near water or wetlands?

## State Requirements

As with many environmental regulations, States have specific regulations and laws associated with water protection and quality. Remember to evaluate State and/or Local requirements.

### 3.3 Safe Drinking Water Act (SDWA)

The SDWA regulates the quality of drinking water. Requirements typically relate to providing public drinking water, waste disposal in underground injection wells and establishing criteria for CERCLA remediation.

Yes	No	Unknown	Criteria for Evaluation
<b>Public Water Supplies and Drinking Water Standards (40 CFR 141-143)</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will WESTON be providing a drinking water supply to the public?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project involve operating a public water supply system that has 15 or more services or serves more than 25 people per day for more than 60 days per year?
<b>Sole-Source Aquifer Protection (40 CFR 149)</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project involve the discharge of contaminants onto or into areas classified as a sole-source aquifer?
<b>Underground Well Injection (40 CFR 144-148)</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project involve the placing of fluids into a bored, drilled, driven or dug well?

## State Requirements

In addition to compliance (and/or more restrictive) with above Federal criteria, States are responsible for implementing and enforcing well-head protection standards.

### 3.4 Resource Conservation and Recovery Act (RCRA)

RCRA provides the classic “cradle-to-grave” concept for waste materials, i.e., management of the waste material from generation to final disposal. RCRA requirements apply to those who generate, transport, store and dispose of wastes. Permits and identification numbers may be required for all categories with limited exceptions.

Yes	No	Unknown	Criteria for Evaluation
<b>Non-Hazardous Solid Wastes (40 CFR 257, 258)</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will WESTON or the site generate any non-hazardous solid wastes?
<b>Universal Wastes (40 CFR 273)</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will WESTON, or the site generate any universal wastes?
<b>Hazardous Wastes Generation and Management (40 CFR 260-262)</b>			

Yes	No	Unknown	Criteria for Evaluation
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will WESTON generate any hazardous wastes?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will WESTON be responsible for managing hazardous wastes generated by the client?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will site activities result in quantities that result in Conditionally Exempt Small Quantity Generator (CESQG), Small Quantity Generator (SQG), or Large Quantity Generator (LQG).
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Has on-site accumulation of waste stream (areas, containers or other device) been evaluated?
<b>Hazardous Waste Treatment and Disposal Permit (40 CFR 264-270)</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will on-site treatment of waste(s) be conducted?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	If off-site disposal has TSDF been evaluated and accepted?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project involve clean-up of hazardous waste or hazardous waste constituents from a RCRA-regulated facility?
<b>Hazardous Waste Transportation (40 CFR 263)</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will WESTON be responsible for preparing hazardous wastes for transportation?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	If transporting wastes, has transporter been evaluated and accepted?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will WESTON sign manifest? If yes, as Generator or as "Agent" for client?
<b>Underground Storage Tanks (USTs) (40 CFR 280)</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will WESTON activities involve the installation, use, maintenance, spill or release clean-up, or decommissioning of a UST storing petroleum or CERCLA-listed hazardous substance?
<b>Used Oil (40 CFR 279)</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will site activities involve the generation, storage or transportation of used/waste oil?
<b>Land Disposal Restrictions (40 CFR 268)</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project involve the generation of wastes meeting Land Disposal Restriction (LDR) criteria?

## State Requirements

Most States have primacy for both hazardous and non-hazardous solid waste; ensure knowledge of specific state requirements for such waste streams.

## 3.5 Comprehensive Environmental Response Compensation and Liability Act (CERCLA)

CERCLA provides a mechanism to clean up uncontrolled or abandoned contaminated sites and hold potentially responsible parties accountable for clean-up costs.

Yes	No	Unknown	Criteria for Evaluation
<b>Release Reporting (40 CFR 300, 302)</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are any of the chemicals stored or used on site listed as a hazardous substance (40 CFR 302.4)?

Yes	No	Unknown	Criteria for Evaluation
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is there a potential for an unpermitted release of a hazardous substance to the environment in excess of its 24-hour Reportable Quantity (RQ)?
<b>Remediation Efforts (40 CFR 300)</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are site remediation efforts under control of Federal Government?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are site remediation efforts under control of a State or Local Government?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are site remediation efforts under Private control?

## State Requirements

Many states have enacted Superfund-type programs. Although many are similar to the Federal program, others may have significant differences to include broader ranges of hazardous substances.

### 3.6 Emergency Planning and Community Right to Know (EPCRA)

EPCRA established a process for developing state and local emergency planning and information programs on hazardous chemicals located at and/or emitted from facilities. Planning requirements apply to any facility that produces, uses or stores threshold quantities or more of any substance on the EPA list of extremely hazardous substances. There are also requirements for facilities that are required to maintain Material Safety Data Sheets (MSDSs) to notify the local fire department of those materials.

Yes	No	Unknown	Criteria for Evaluation
<b>General</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will WESTON or WESTON subcontractor have chemicals on site?
<b>Emergency Planning Notifications (40 CFR 355)</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Do any of the chemicals used or stored on site meet the definition of a hazardous substance and meet or exceed the threshold planning quantity (TPQ) for that chemical or 500 pounds, whichever is lower? (See 40 CFR Part 355 Appendix A and B). <i>If inventory meets criteria (material and quantity) then reports to LEPC, local Fire Department, and SERC are required. (See 40 CFR 370.21).</i>
<b>Emergency Release Notifications (40 CFR 370)</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is there the potential for a release of listed substances (see 40 CFR 355, Appendices A and B and 40 CFR 302) that could result in exposure to persons off-site?
<b>Community Right to Know/Hazardous Chemical Inventory Reporting (40 CFR 370)</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	At any point in time is any chemical in a quantity at or more than 10,000 pounds that requires an MSDS?

## State Requirements

There are specific reporting and documentation requirements under EPCRA for state and local entities.

### 3.7 Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

The purpose of FIFRA is to protect public health and the environment from the misuse of pesticides by regulating the labeling and registration of pesticides. In addition to data necessary for the registration of pesticides sold there are requirements for the certification of applicators of those pesticides listed as restricted use.



Yes	No	Unknown	Criteria for Evaluation
<b>Labeling and Packaging Requirements (40 CFR 156, 157)</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Does the project involve the use or application of pesticides?
<b>Certification of Applicators (40 CFR 171)</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is the use of a licensed pesticide applicator required (use of restricted use pesticides)?

### 3.8 Toxic Substances Control Act (TSCA) see also OSHA requirements

Much of TSCA deals with the manufacture, use and distribution of chemicals in commerce with limited impact to WESTON. There are, however, management requirements (to include remediation and disposal efforts) for specific chemicals (most importantly lead-based paint, PCBs, and asbestos).

**Note:** A “Yes” will require an appropriate technical approach to address the toxic material and must be included within the project-specific HASP. A “No” will require appropriate documentation from the Client or their designee describing how this determination was reached. An “Unknown” will require follow-up and receipt of documentation prior to proceeding.

WESTON may conduct its own survey and analysis to resolve “No” and “Unknown” responses if necessary.

Yes	No	Unknown	Criteria for Evaluation
<b>Lead-Based Paint (40 CFR 745)</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Has the site been evaluated for the presence of lead or lead-containing materials?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project involve the removal of lead-contaminated materials?
<b>Polychlorinated Biphenyls (PCBs) (40 CFR 761)</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Has the site been evaluated for the presence of PCBs or PCB-contamination?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project involve the removal or handling of PCBs?
<b>Asbestos (40 CFR 762)</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Does the site or structures contain asbestos containing material (ACM)?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project involve the disruption or removal of ACM?

### 3.9 Natural Resources and the Endangered Species Act

The Endangered Species Act (ESA) was passed to designate and protect fish, wildlife and plant species that are endangered or threatened as well as designate critical habitat for those species. Compliance with the ESA is required within the context of this checklist for not only necessary permits (e.g., Stormwater), but, as a means of understanding the potential environmental impact of our work efforts.

Yes	No	Unknown	Criteria for Evaluation
<b>General</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is the project site in an area identified as habitat for endangered, threatened or special interest species?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project result in a change in the diversity or numbers of any species of plants or animals?

Yes	No	Unknown	Criteria for Evaluation
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project result in the reduction of numbers or habitat damage to any unique, rare, threatened or endangered species of plants or animals?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project result in the introduction of new species of plant or animal (including microbes, etc.)?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project result in any barrier(s) to the migration or movement of animals?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project result in any significant alteration, deterioration, or destruction of habitat?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project result in the alteration, destruction, or significant impact to any environmentally sensitive areas (e.g., wetlands, floodplains, critical habitat, prime farm land, coastal zones, etc.)?

Note that a location-specific understanding of the ESA is necessary for completion of applications relating to air quality permitting, stormwater permitting and potentially others.

### 3.10 National Environmental Policy Act

The purpose of the National Environmental Policy Act (NEPA) is to encourage harmony between man and the environment, promote efforts to prevent or eliminate damage and stimulate the health and welfare of man, and to enrich the understanding of the ecological systems and natural resources that are important to the Nation. In context, NEPA requires federal agencies to prepare an environmental impact statement covering proposed actions that could significantly affect the quality of the human environment.

Yes	No	Unknown	Criteria for Evaluation
<b>General</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is the project a major Federal action, or project, or a project requiring a federal permit, receiving federal funds, or located on federal land? (NEPA)

### 3.11 Noise (see also OSHA requirements)

The Noise Control Act promotes the policy that the environment is to be free of noise that jeopardizes health or welfare. While there are limited Federal/EPA regulations, there are State and Local regulations/ordinances that are applicable to work tasks.

Yes	No	Unknown	Criteria for Evaluation
<b>General</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project cause an increase in noise levels?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is the project site near sensitive receptor populations (e.g., residences, hospitals, schools, etc.)?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will site activities extend beyond typical daylight hours?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are there local noise ordinances in effect?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Does the contract (or specifications) identify noise monitoring or other criteria?

### 3.12 Occupational Safety and Health (specifically 29 CFR 1910 and 1926)

The overall goal of the Occupational Safety and Health Act (OSH Act) is to assure that employees are not adversely affected to hazards that they may be exposed to in the course of employment. All work activities conducted by WESTON must comply with applicable components of the General Industry Standards, the Construction Standards, or the applicable requirements of Client-specific criteria (e.g., the Corps of Engineers).

Yes	No	Unknown	Criteria for Evaluation
<b>General</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will project activities be conducted under OSHA Construction Standards?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will project activities be conducted under OSHA General Industry Standards?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will project activities be conducted under the requirements of EM 385-1-1 (USACE)?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Does the client have any specific occupational/safety requirements for the site work?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will project activities be conducted under other standards?

Based upon site activities, location and tasks follow all applicable criteria outline in WESTON's Safety and Health requirements guidelines.

### 3.13 Transportation (specifically 49 CFR Parts 171-179, 383, 390-399)

Transportation in the context of this checklist typically relates to the transportation of hazardous chemicals. The Department of Transportation (DOT) has specific regulatory requirements that must be met if WESTON either conducts or oversees the preparation for transport or actual transportation of hazardous chemicals/materials designated by DOT.

**Note:** *Security Plans are required for transporting hazardous materials in an amount that must be placarded, hazardous materials in a bulk packaging having a capacity equal to or greater than 3,500 gallons for liquids or gases or more than 468 cubic feet for solids, or a select agent or toxin regulated by the Centers for Disease Control and Prevention under 42 CFR Part 73. Contact your local Dangerous Goods Advisor for assistance.*

Yes	No	Unknown	Criteria for Evaluation
<b>General</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will site activities involve the transportation (or storage incidental to transportation) of hazardous materials?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will WESTON personnel be transporting hazardous materials (in any amount)?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will WESTON personnel be operating vehicles meeting the definition of a commercial vehicle?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will WESTON personnel be operating vehicles transporting a hazardous material in a placarded amount?

### 3.14 Radiation

Various regulations under the auspices of the Nuclear Regulatory Agency (10 CFR) require specific procedures for the handling, training, storage and maintenance of nuclear materials.

Yes	No	Unknown	Criteria for Evaluation
<b>General</b> <i>(For the following questions indicate whether these tasks are by WESTON, Subcontractor, Client or Vendor.)</i>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will Radiation sources be used or present?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project involve the transportation of radioactive material?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project involve the storage of radioactive material?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project involve the disposal of radioactive material?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project involve the use or storage of a radioactive source (e.g., troxler gauge, XRF)?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Have users been properly trained and certified?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are users operating under a radiation monitoring program?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Have rad licenses been transferred and/or the client notified of the presence of rad sources?

Based upon site activities, location and tasks follow all applicable criteria outlined in WESTON's EHS Program.

### 3.15 Historic/Archaeological

There are numerous Federal, State, Local and Tribal requirements outlining procedures to protect historic and cultural properties. These include those that exist as well as those that are discovered during work activities.

Yes	No	Unknown	Criteria for Evaluation
<b>General</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is the site or project in an area that is of historic or archeological interest?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project result in alteration or destruction of an archeological or historical site, structure, object or building that is on or eligible for inclusion in the National Register of Historic Places?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project involve the excavation, altering, defacing, or removal of archaeological objects or resources or Native Indian graves, cairns, or glyptic records?

Note that a location-specific understanding of historic and archaeological issues is necessary for completion of applications relating to air quality permitting, stormwater permitting and potentially others.

### 3.16 Miscellaneous

The following items are included based upon information that must be evaluated for certain WESTON work criteria, for certain sites e.g., real-estate transactions, military locations and for specific hazards.

Yes	No	Unknown	Criteria for Evaluation
<b>General</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Have subcontractors been screened by Procurement and an EHS Manager or Safety Officer?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Has a Client Services Manager (CSM), Project Manager (PM), or WESTON Officer engaged WESTON's Subcontractors using the Subcontractor Talking points?

Yes	No	Unknown	Criteria for Evaluation
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Has a project Kick-off meeting been planned?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will a Safety Officer or an EHS Manager be involved in the kick-off meeting?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the average work day including driving to and from the site exceed 12 hours? If yes, there must be a plan for addressing driving safety and fatigue.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will project personnel be driving vehicles they are not familiar with? If yes, there must be a plan for addressing driving safety.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will there be work at elevation (greater than 4 foot difference in elevations between working levels, work from ladders, work from scaffolding, use of aerial lifts, floor openings, wall openings)?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will there be potential for struck by hazards (moving equipment, thrown or falling objects or material)?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will there be potential for being caught in (conveyors, power-take-off, screens, etc.) or between moving machinery?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will there be work with or within 10 feet of exposed electrical conductors?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are there overhead utilities?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are there underground utilities?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project add additional traffic volume or types (material or equipment haul trucks) that may require community approval or plans?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will there be a traffic control plan for off-site and on-site vehicles?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is the facility a military facility?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Has the potential for UXO/MEC encounter been objectively evaluated?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will there be slip, trip and fall hazards
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will there be repetitive and or heavy lifting?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	If demolition work has the demolition plan, engineering survey and required components been addressed?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are there OSHA Specific Standards applicable (asbestos, lead, cadmium, arsenic, hexavalent chromium, benzene, vinyl chloride, methylene chloride, butadiene, formaldehyde, dibromochloropropane)?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will work be performed over or near water or boats?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will boats be used?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will Lifting Equipment and rigging be used?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is there a communication Plan for letting neighbors know of WESTON activities that may impact them?

### 3.17 Real Estate and Tenant Issues

WESTON as an owner or operator assumes liability for actions or activities conducted by ourselves or by others (tenants). We must ensure compliance with Federal, State and Local requirements. The following outline major issues, however, as indicated previously for the EHS Checklist, it is not meant to be comprehensive. Remember, if we have tenants occupying portions of facilities that are under our control, we have an obligation to understand and assure compliance. For the following issues compliance may be by WESTON, by various tenants or a combination, ensure that each tenant is evaluated. Note that various components of the previous EHS Checklist sections may be appropriate.

Yes	No	Unknown	Criteria for Evaluation
<b>Air</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are boilers or other pressure vessels (e.g., chillers, air receivers) located within our work space or at tenant locations?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Have they been certified and inspected?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Do emission sources (e.g., boilers, chillers, bulk oil storage, etc.) have proper registration (federal, state or local)?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are tenants responsible for compliance with inspections and permits?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is WESTON responsible for inspections and permits?
<b>Occupancy and Other Permits</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Do Business Permits/Certificate of Occupancy Requirements: State, County, City/Municipality need to be addressed? If yes, is WESTON responsible? ____ and/or are tenants responsible? ____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are Fire Code Inspections (e.g., materials storage, electrical, suppression systems) due? Are Corrective Actions due from past inspections? ____ If yes, is WESTON responsible? ____ and/or are tenants responsible? ____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are local permits and/or registrations for USTs or ASTs available or needed?
<b>RCRA</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is the facility a Hazardous Waste Generator? If yes, what size? ____ Is WESTON responsible? ____ What is the waste stream? _____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Do tenants generate Hazardous Wastes? If yes, what quantity? ____ What is the waste stream? ____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are appropriate permits available for waste generation?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is facility and/or are tenants under litigation or regulatory action for non-compliance with RCRA?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are USTs or ASTs on site? If yes, what are type, size, contents _____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Have USTs been upgraded for overflow and spill control protection?
<b>Water and Stormwater</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is a stormwater permit and plan necessary for the site?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is a NPDES and/or local discharge permit necessary for the site?
<b>EPCRA</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Do any of the chemicals used or stored on site meet the definition of a hazardous substance and meet or exceed the threshold planning quantity (TPQ) for that chemical or 500 pounds, whichever is lower? (See 40 CFR Part 355 Appendix A and B). <i>If inventory meets criteria (material and quantity) then reports to LEPC, local Fire Department and SERC required. (See 40 CFR 370.21).</i>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is WESTON responsible for compliance?

Yes	No	Unknown	Criteria for Evaluation
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are Tenants responsible for compliance?
<b>SPCC and Oil</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will oil or petroleum products be stored at the site/operation?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the storage capacity of oil or petroleum products exceed 1320 gallons in above ground storage (include only containers equal to or larger than 55 gallons), or 42000 gallons underground?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is WESTON responsible for compliance?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are Tenants responsible for compliance?
<b>Compliance</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is the site under enforcement action for regulatory non-compliance?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is any Tenant under enforcement action for regulatory non-compliance?

### 3.18 Explosives

Various regulations under the auspices of the Bureau of Alcohol, Tobacco, Firearms and Explosives (BATFE), 27 CFR Part 55 – Commerce in Explosives and 27 CFR Part 55 the Safe Explosives Act, require specific procedures for the purchase, use, storage, handling and sale of explosives or explosive containing items. Attention to these questions will help to manage our risk when developing projects that may involve explosives or munitions.

Yes	No	Unknown	Criteria for Evaluation
<b>General</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project involve the handling or use of explosives or munitions that are either new or recovered (e.g. dynamite, military munitions, UXO, detonating cord, TNT, etc.)?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project involve the storage of explosives?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project involve the transportation of explosives?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Have project personnel been cleared by BATFE as either a Possessor or Responsible Party to handle explosives?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will the project require a State Licensed Blaster?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Will WESTON's Explosives Users Permit be required to execute the project? If yes, has the UXO Service Line Manager been notified?

### 3.19 Sustainability

There are a wide range of options for integrating sustainability into the execution of projects, far beyond what can be incorporated into this checklist. The following are a few broad questions which are designed to stimulate thinking about how sustainable approaches could be utilized throughout project execution. A checklist of credits used in evaluating projects for LEED (Leadership in Energy and Environmental Design) could be used here in addition to the checklist below. Inclusion of an employee who is LEED AP Certified in the development of the work plan could help add other considerations, such as sustainable sites and efficient materials and resources. See the WESTON Sustainability Portal <http://westonportal/sites/sustainability/default.aspx> for further details.

Yes	No	Unknown	Criteria for Evaluation
<b>General</b>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are there opportunities to reduce travel-related energy and environmental impacts associated with the project through such techniques as carpooling, use of videoconferencing, telecommuting or utilization of local personnel?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Has consideration been given to the potential for beneficial reuse or recycling of materials that will be excavated, removed or discarded during project execution?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are there opportunities to utilize alternative or renewable energy on the project, through applications such as photovoltaics (solar) or wind power for remote sensing and/or trailer power, or alternative fuel (e.g. biodiesel) for fleet vehicles or equipment?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Have “green” considerations been integrated into the procurement process for materials and or equipment (e.g. recycled content, energy efficiency, recyclability, minimal packaging)?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are there opportunities to increase energy or water efficiency in the execution of the project through selection of appropriate equipment or technical approaches?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are there opportunities to offset some of the environmental impacts of the project through purchase of carbon credits, renewable energy credits or wetlands banking?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Could a Community Partnering/Make-a-Difference event be coordinated or integrated with this project?